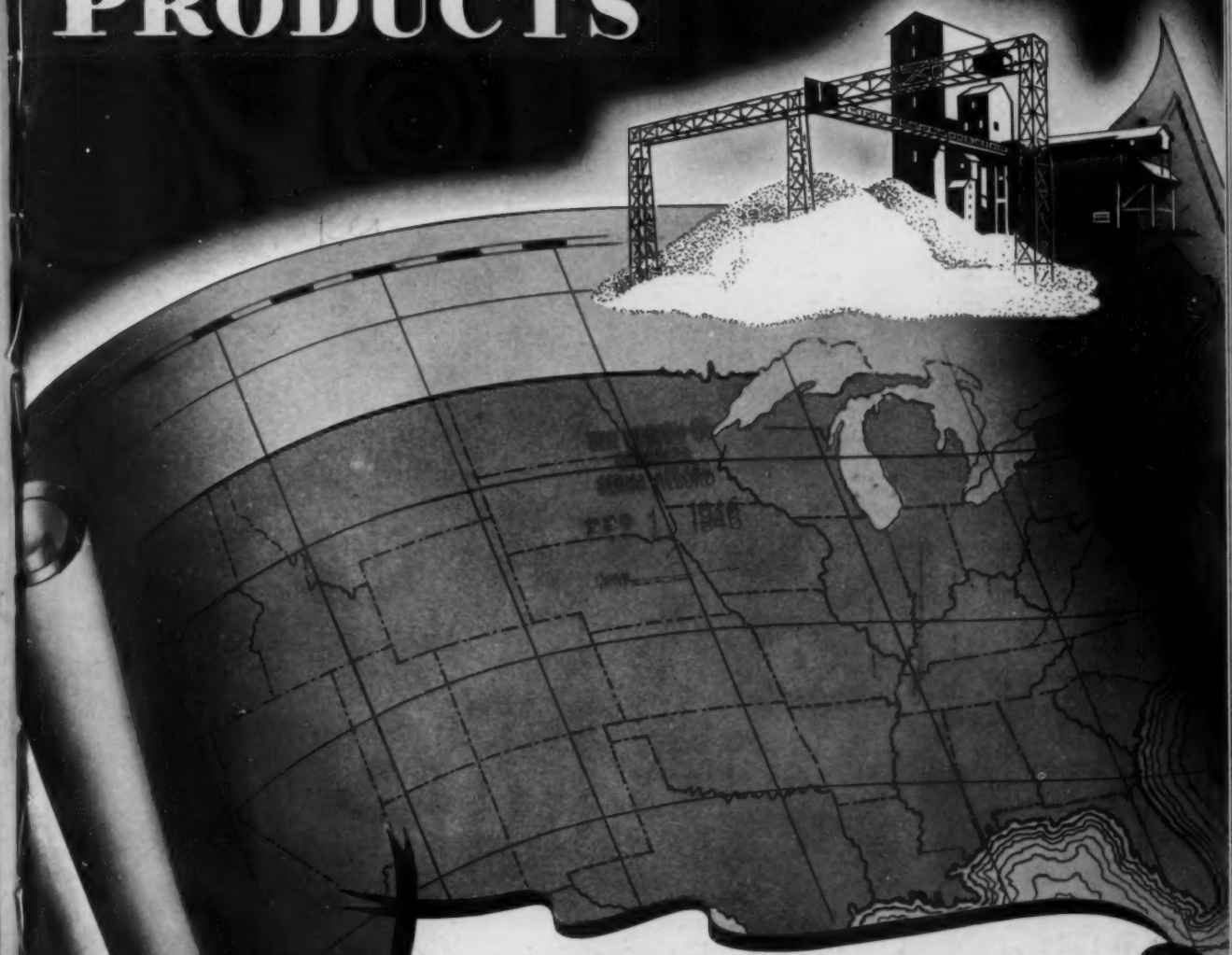
ROCK PRODUCTS

OCTOBER 1945

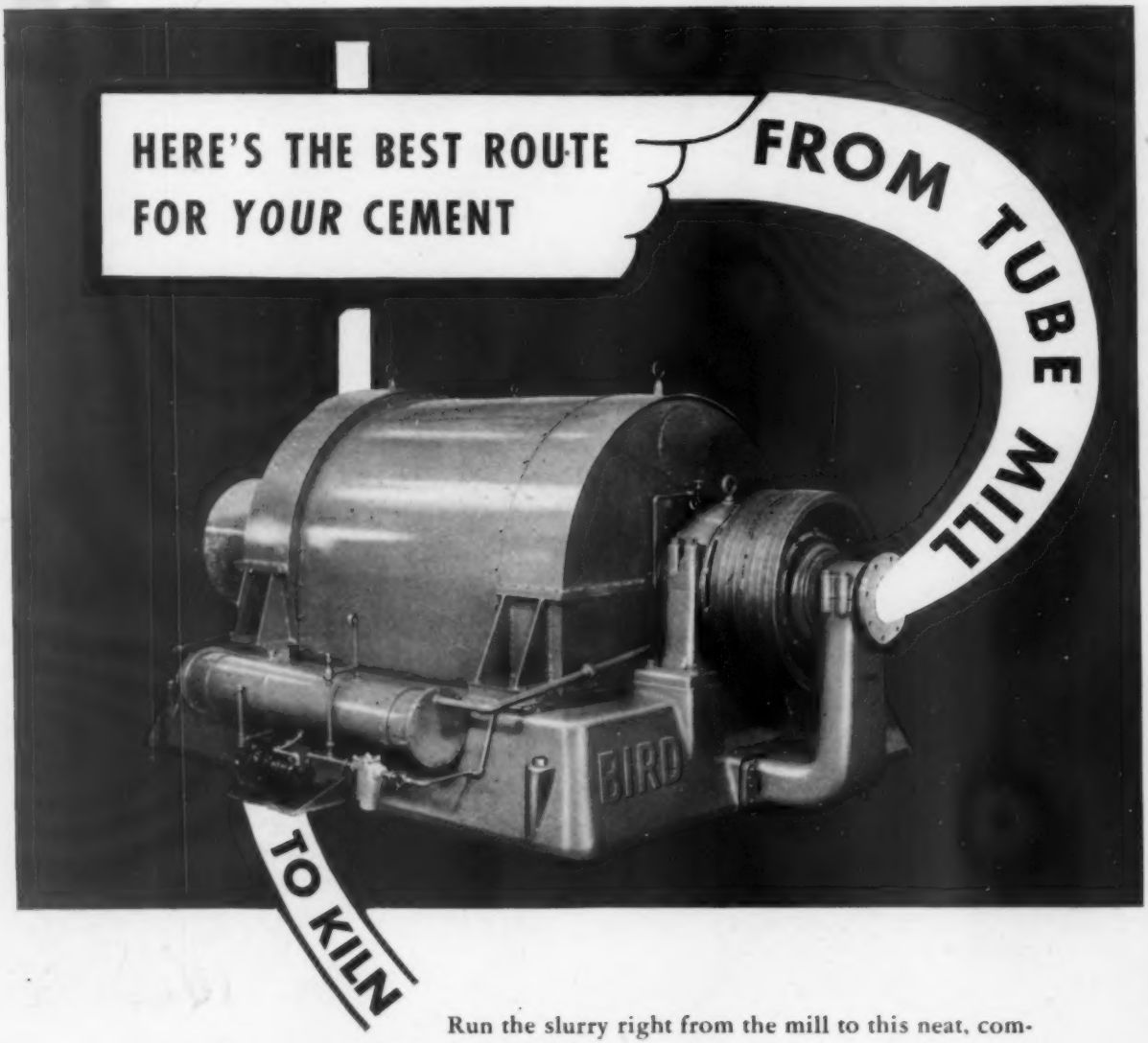


Starting a new series on:

PATTERNS FOR THE FUTURE

Operating Trends Analyzed Geographically

NOV 20 1945 ©CIB 2268



Run the slurry right from the mill to this neat, compact, self-contained, BIRD CLASSIFIER.

You can add the clay to the feed, if you wish.

The BIRD takes out all the fines just as you want them for burning, without thickening. The coarse returns for regrinding are so clean that tube mill efficiency and capacity are substantially increased.

Close your grinding circuit with this easily installed, automatic, continuously operating Bird Classifier and you'll burn a better product and more of it at lower cost.

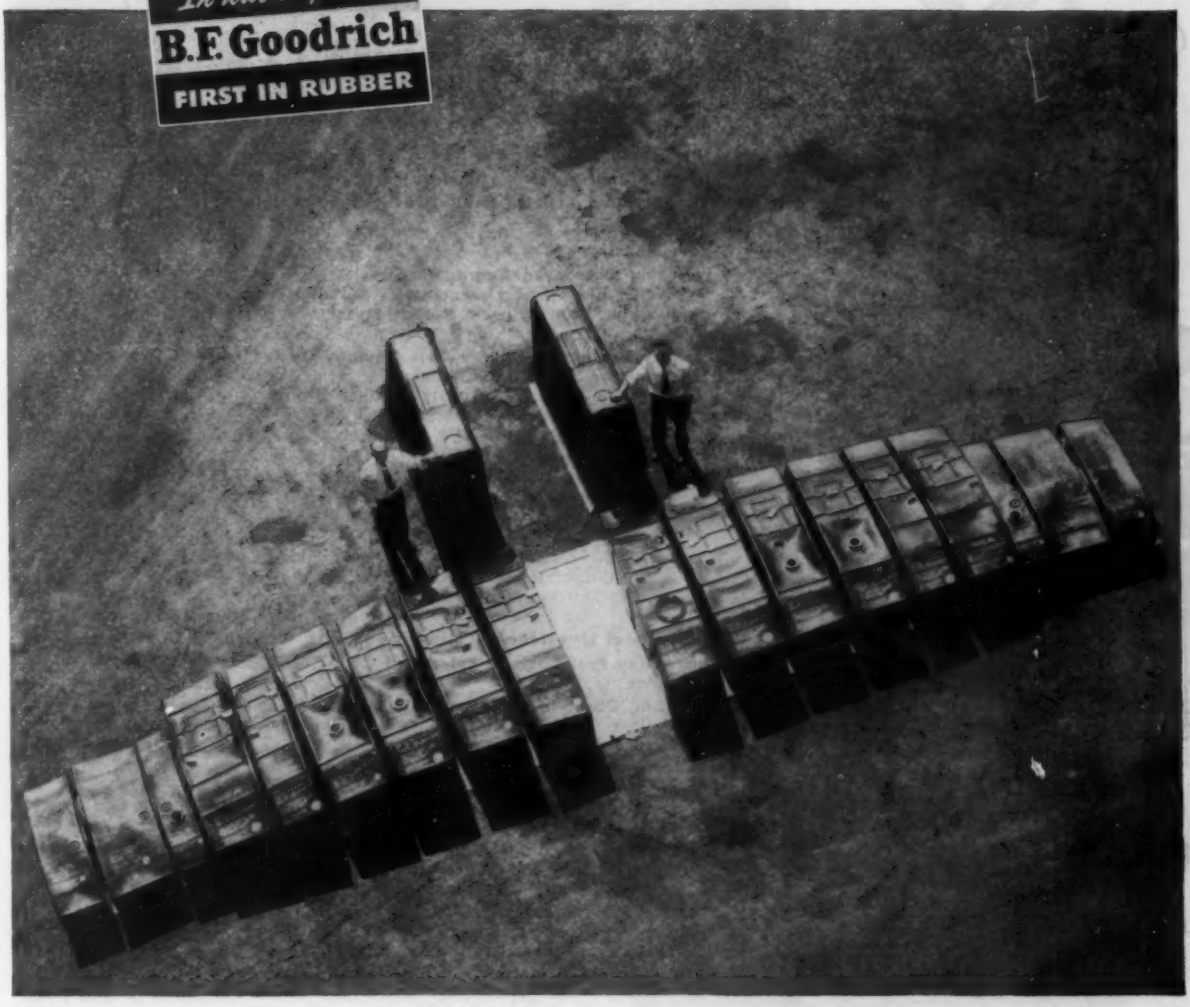
Now is the time to do it. Get in touch with *Bird Machine Company, South Walpole, Massachusetts* for the whole story on

BIRD Centrifugal **CLASSIFIER**

In war or peace

B.F.Goodrich

FIRST IN RUBBER



Flight formation for 3,000 gallons of gas

A typical example of B. F. Goodrich development in rubber

THOSE 20 tanks, arranged just as they are in the plane, are what it takes to carry the fuel for a Liberator bomber. They hold enough gasoline to last the average car owner four or five years. Enemy bullets won't hurt them because they're the bullet-sealing fuel cells made by B. F. Goodrich and developed early in the war.

But even though they sealed bullet holes they had the dangerous habit, at first, of springing leaks miles inside enemy territory. Metal parts of the tanks—fill pipes, for example—tore loose from the soft rubber walls of the tanks under the constant vibration of the plane in flight.

Some kind of stronger cement was needed to bond rubber to metal, and the government asked for one that would stand a 35-pound pull. B. F. Goodrich men worked on the problem, developed "Plastilock 102" that stands 85 pounds. Since it has been used, service failures have dropped to almost nothing.

The rubber cement you may use at home is only one of hundreds of adhesives B. F. Goodrich makes for hundreds of applications in industry. And adhesives are only one group of thousands of products this company makes. In every one of them development is going on constantly, so that the rubber product you used last year is probably better today and will be still better next year. *The B. F. Goodrich Company, Akron, Ohio.*

B.F. Goodrich

RUBBER *and* SYNTHETIC *products*

In This Issue

Gauge Plant Capacity to Market — *Brer Nordberg* — 55

Washington News — 57

Rocky's Notes — 59

The Personal Side of the News — 61

News of the Industry — 65

Cement Plant Repairs Heavy Castings by Welding — 69

Hints and Helps — 70

New Machinery — 72

Weighing Out Seven Aggregate Sizes
W. G. Block Co., Davenport, Iowa, builds unusual material handling plant with bin storage capacity of 2000 tons — *O. H. Wustrack* — 74

Primary Crusher in Quarry Cuts Haulage Costs
Avondale Stone Co., Chattanooga, Tenn., installs long conveyor to transport primary crusher product to plant for secondary crushing and screening — *H. E. Swanson* — 76

Meet Tough Specifications by Adding 50-Mesh Sand
Becker County Sand and Gravel Co., Cheraw, S. C., blends fines with coarser product by regulated feed to conveyor belt — 78

Operating Trends in the Rock Products Industry
First of a series of articles which features Illinois, will cover the specifications, operating practices, and geology. Succeeding articles will describe the problems and operating practices in other sections of the country — *Herbert E. Swanson and Nathan C. Rockwood* — 79

Agricultural Limestone—A Life-Giving Grist — *Dr. William A. Albrecht* — 92

Decreasing Fuel Costs in Pulverized Coal-Fired Cement Kilns — *J. D. Clendenin* — 95

Replacing Obsolete Equipment
Methods of financing purchase of new equipment without impairing working capital — *W. G. Jorgenson* — 97

Eliminate Quarry Accidents
Safety practices at the Hudson, N. Y., quarry of Universal Atlas Cement Co. — *A. W. Worcester* — 98

Sells Stone Business on Royalty
Monon Crushed Stone Co., sold on long term royalty deal, probably involving largest sale of crushed stone property by individuals on that basis — 100

Economical Manufacture of Quality Lime
Part 3: Determination of temperature difference and heat transfer rate prevailing in lime kilns — *Victor J. Azbe* — 102

Surface Area Calculation with Special Slide Rules — *C. J. Knickerbocker* — 108

Pennsylvania Stone Producers Meeting — 110

Surfaces for Vibrating Screens — *Nathan C. Rockwood* — 112

Does Your Market Warrant Increased Capacity — *W. D. M. Allan* — 145

Plant Plans for Concrete Masonry — 146

Processing Cinders for Concrete Products — 148

Detecting Staining and Popouts — 150

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LOAD LUGGER
—the Sure Way to Cut Quarry Costs

Equip your trucks with Load Luggers and watch them set new records in hauling materials!

It is easy for the workmen to fill the low-level buckets on the ground . . . then the Load Lugger picks them up and hauls them away for dumping. Your truck is always on the move . . . no waiting for loading up. The time saved by this method adds to your profits.

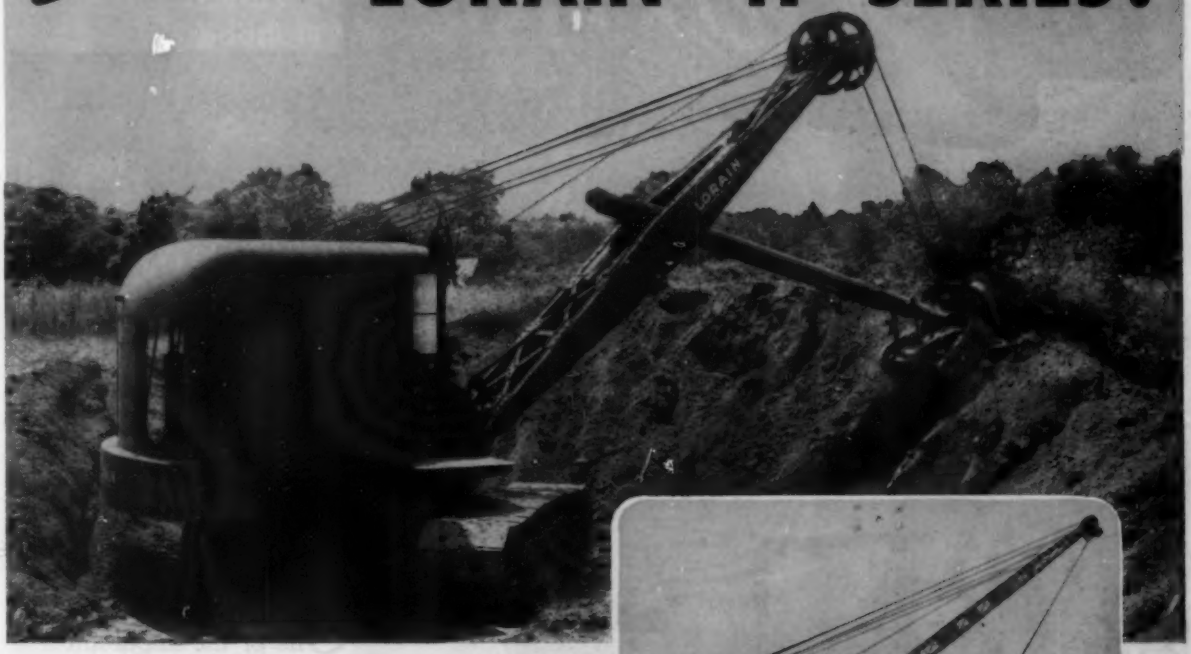
Use the Load Lugger for stripping overburden, feeding crushers, moving stockpiles, excavating, road building and construction jobs . . . wherever materials are loaded by hand.

Write for Bulletin

BROOKS EQUIPMENT AND MFG. CO.

410 Davenport Road, Knoxville, Tenn.
Distributors in All Principal Cities

NOW... THE GREAT NEW LORAIN "41" SERIES!



Every one of these four new performers—the Lorain 41 Crawler, the Moto-Crane 414, the Moto-Crane 416, and the Self-Propelled Crane 414—has its own long list of great features. Any one of these machines is good news by itself. But Thew now gives you all of them at once—so you may have the one that's best in mounting, boom equipment, speed and basic efficiency for your job. The two-speed, chain drive crawler, for example, gives you ¾ MPH and 1⅞ MPH. The rubber-tired, single-engined, Self-Propelled Crane offers four speeds to 7 MPH. The two rubber-tired Moto-Cranes—two-engined—four or six wheel drive—give you fastest mobility of all, up to 30 MPH.

Here are just a few things you'll like in the new Lorains! Entire 2-speed chain-drive crawler mounting is wider, longer, heavier with new, positive 4-way ratchet and pawl tread and travel lock.

A brand new shoe type swing clutch that gives far smoother action and many times the usual service life. Greatly increased capacities (ask for the new ratings.) ¼-yd. chain crowd shovel. Dual boom stop on all crane booms . . . a double safety feature.

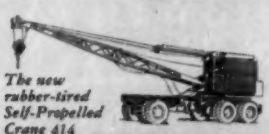
Two piece, all-welded, pin-connected, fast-assembly boom interchangeable for all crane, clam and drag work. All machines convertible to shovel, crane, clamshell, dragline and backhoe work. All available with gas, diesel or electric power.

As soon as you see these new Lorains in action, you'll want to put one to work! Check the features and capacities we have room to give you here—then see your nearest Lorain Distributor for the complete facts!

THE THEW SHOVEL COMPANY • LORAIN, OHIO

SEE YOUR LORAIN DISTRIBUTOR NOW!

The new rubber-tired Moto-Crane 416



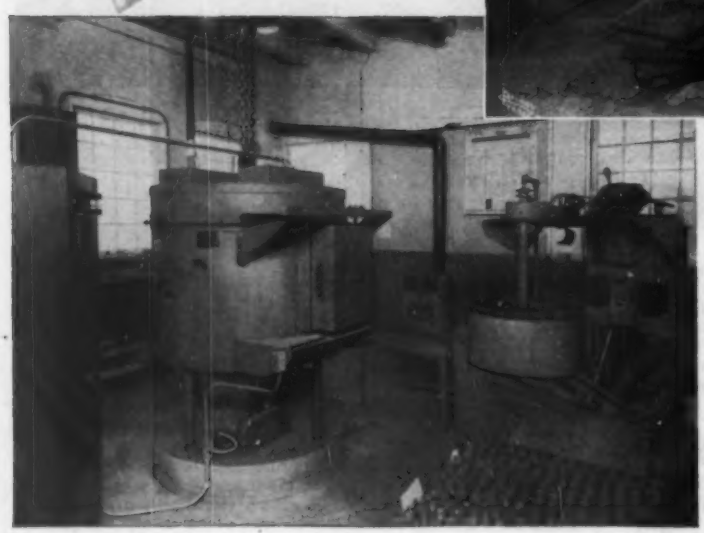
The new rubber-tired Self-Propelled Crane 414

Reg. Trade Mark

thew-Lorain

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

Near you there is a Service Shop for TIMKEN ROCK BITS



One of the important reasons for the widespread use of Timken Rock Bits in the mining, quarrying and construction industries is the availability of prompt and economical service for converting hollow drill steels for use with Timken Rock Bits.

Located at 80 strategic centers throughout the country are modern well-equipped independently operated service shops, such as the one illustrated here. Most of these shops are also able to recondition used Timken Rock Bits for additional drilling—thus decreasing your drilling costs.

If your operations do not justify the maintenance of such a shop you may still enjoy the advantages of Timken Rock Bits by utilizing the services of the shop operator in your immediate locality. Write us for his name and address.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
ROCK BITS

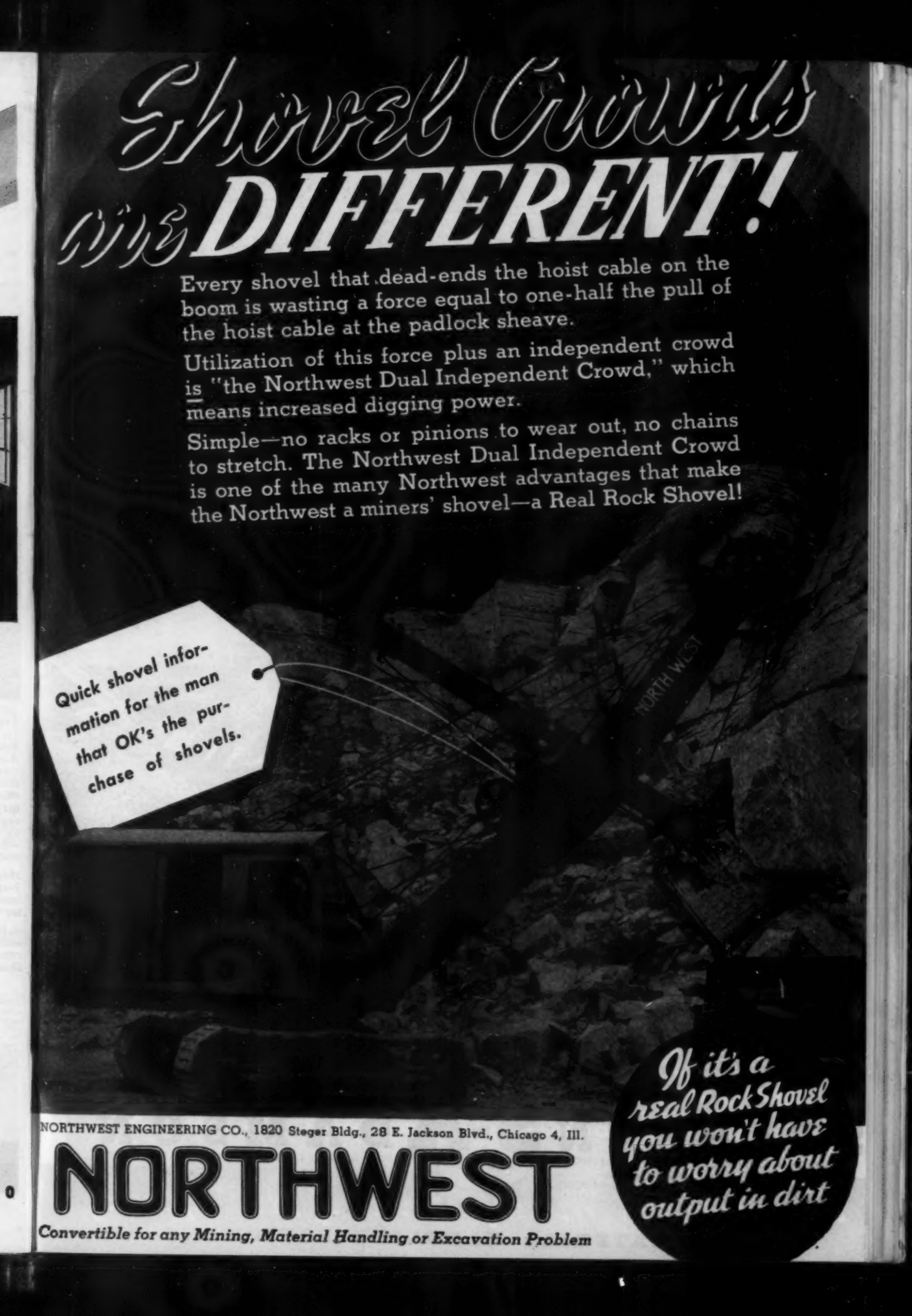
THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO

Shovel Crowds are DIFFERENT!

Every shovel that dead-ends the hoist cable on the boom is wasting a force equal to one-half the pull of the hoist cable at the padlock sheave.

Utilization of this force plus an independent crowd is "the Northwest Dual Independent Crowd," which means increased digging power.

Simple—no racks or pinions to wear out, no chains to stretch. The Northwest Dual Independent Crowd is one of the many Northwest advantages that make the Northwest a miners' shovel—a Real Rock Shovel!

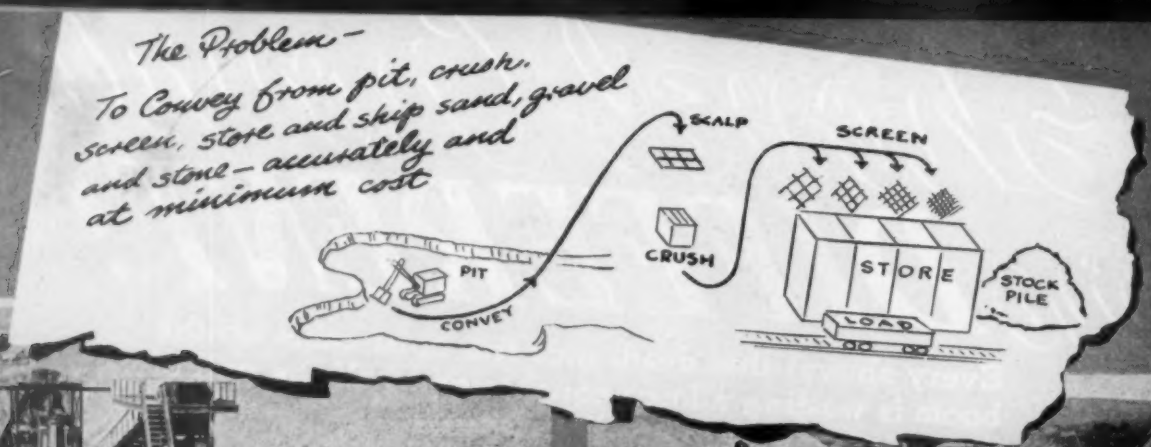


NORTHWEST ENGINEERING CO., 1820 Steger Bldg., 28 E. Jackson Blvd., Chicago 4, Ill.

NORTHWEST

Convertible for any Mining, Material Handling or Excavation Problem

If it's a real Rock Shovel you won't have to worry about output in dirt



Belt conveyor from final screening to storage

Scalping and crushing station

SO THE MOUNTAIN CAME TO MAHOMET

Belt conveyor to and from screening

One of the large crushed-gravel ballast producing plants turned this Mountain and Mahomet problem over to S-A engineers and the mountain is now moving into the maws of commerce at the rate of 700 tons per hour.

Miraculous? No, just an ordinary run-of-mine engineering job for Stephen-Adamson who have been solving conveyor problems such as this for more than 42 years.

Whether your problem calls for specially designed equipment or can be solved with an assembly of standard and auxiliary S-A units, you can depend upon getting the utmost in efficiency to meet your particular requirements.

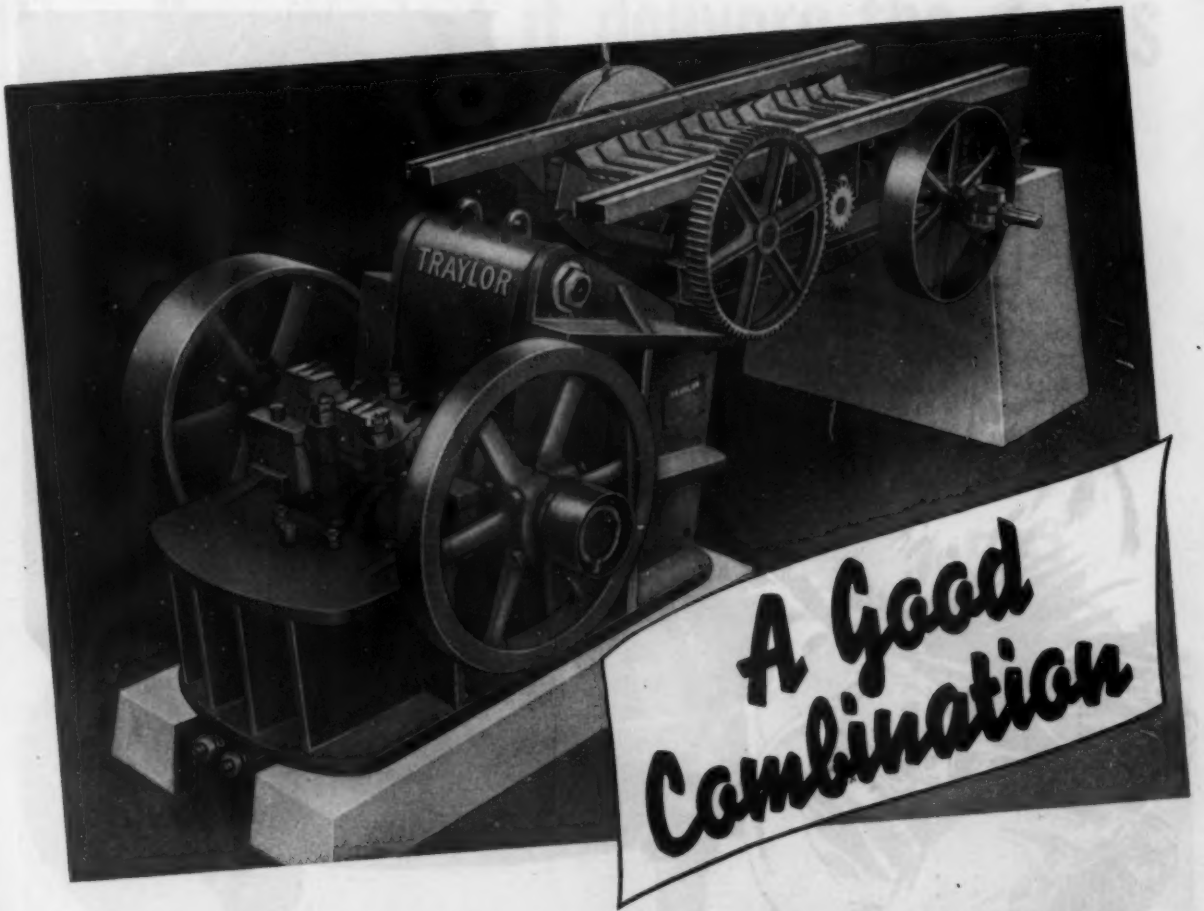
Consult Stephens-Adamson on present and future material and handling problems.

STEPHEN S-A ADAMSON MFG. CO.

7 RIDGEWAY AVENUE, AURORA, ILLINOIS — LOS ANGELES, CALIF. ★ BELLEVILLE, ONT.

Designers and Manufacturers of All Types of

BULK MATERIAL HANDLING EQUIPMENT



A jaw crusher built to stand up under hard use, day after day, and a heavy duty feeder to keep the crusher working steadily, are a good combination to have in any rock products plant. With the use of a heavy duty feeder you get up to 40% greater capacity from the crusher with a steady, even feed. This increased production makes the crusher not only more efficient but also more economical to operate.

With reconversion under way everywhere, the demand for rock products increasing each day, and keener competition, it is to your advantage to put a combination such as this to work in your plant.

Write for further details about Traylor Jaw Crushers and Heavy Duty Apron Feeders, or, better still, ask our representative to call at your convenience.

WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
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Old Betsy has been in operation for many a year now. It's true, she's in for a "skin treatment" now and then but it's this economical rejuvenation that keeps her going, that never lets abrasion reach a vital part or put Betsy down for good.

We've got to tell you, those "bumps" on Betsy's hide aren't age—they're STOODY SELF-HARDENING and they're put there for the express purpose of catching and holding the earth. You see, because Stoody Self-Hardening is so much more wear resistant, stringer beads spaced equally over large surfaces give ample wear protection, usually double bucket life, save welding time and save hard metal. Earth packs between the stringers, forms a shield between bucket parts and sliding earth. As Stoody Self-Hardening stringers wear away, new ones are applied between the old. Stoody Self-Hardening stringers keep your buckets going, equalize wear over the surface, reduce operating costs and eliminate unnecessary downtime.

STOODY SELF-HARDENING is available in both coated and bare rods for D. C. electric application and can be purchased through distributors in all major cities. 50c per lb., f.o.b. distributor's warehouse or Whittier, California.

GET THESE FACTS! How to use Stoody Self-Hardening to best advantage on all your earthworking equipment. Full of illustrations, hard-facing kinks, material requirements and other essential information for hard-facing rapidly wearing parts. Write for free STOODY SPECIFICATION SHEETS! No obligation STOODY COMPANY, 1139 W. Slauson Ave., Whittier, Calif.

For building up worn areas before hard-facing with Stoody Self-Hardening, specify the new Stoody Manganese. You'll get greater speed of deposit, easier slag removal, low penetration with high build-up.

STOODY HARD-FACING ALLOYS

Retard Wear — Save Repair

It's all wet—but it delivers the goods

THE main conveyor belt at one of the largest sand and gravel plants in Texas operates 10 hours a day — *and under the stock piles is exposed to dripping moisture 24 hours a day, every day.*

Working in a continuous shower bath like this is enough to make any conveyor belt give up — but this 985-foot-long Goodyear Style B belt has been carrying wet sand, gravel and rock up to four inches in size for more than twelve years. During that time, it has carried more than FOUR MILLION TONS of this wet material, without a single shutdown because of belt failure.

Such standout service attests the value of Goodyear's unique mildew-inhibited construction — a plus that assures long, trouble-free life under severest moisture conditions.

Goodyear is a specialist in conveyor belts for every type of construction or quarrying operation — builds belts from babies for portable plants to 10-mile-long "rubber railroads" that travel straight as a crow flies over hills, valleys and flatlands. If you have a conveyor belt problem, why not consult the G.T.M.—Goodyear Technical Man? For details, write Goodyear, Akron 16, Ohio, or Los Angeles 54, California.

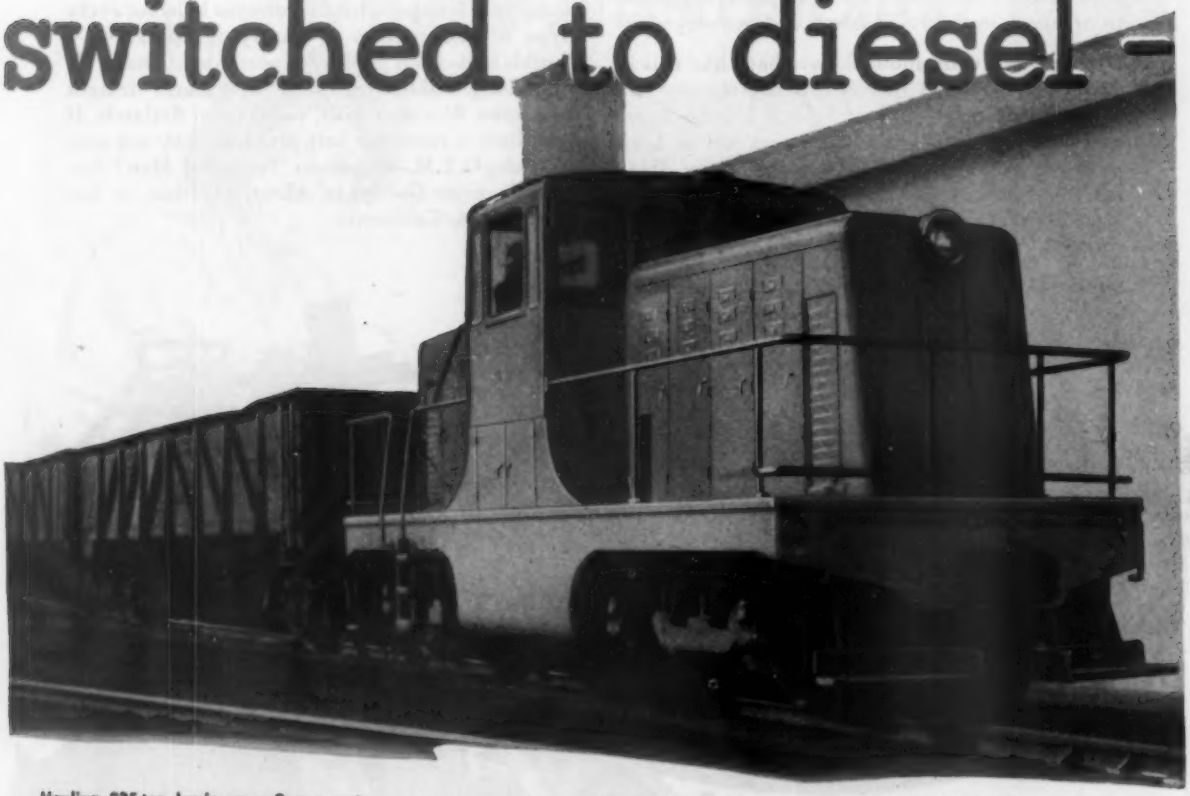
***UNDER THIS STOCK PILE** the conveyor belt is in a continual shower bath — must withstand constant dampness plus constant abrasion.*

FOR HOSE, BELTING, PACKING, MOLDED GOODS AND TANK LININGS built to the highest quality standard in the world, phone your nearest Goodyear Industrial Rubber Products Distributor.

***ANGLING STEEPLY FROM STOCK PILE** to loading tipple, this Goodyear Style B Conveyor Belt has operated without interruption for more than 12 years, carried more than 4 million tons of highly abrasive materials.*

PERFORMANCE!

switched to diesel –



Hauling 225-ton loads up a 3 per-cent grade is all part of every day's work for this 65-ton G-E diesel-electric.

GE

diesel-electric INDUSTRIAL LOCOMOTIVES

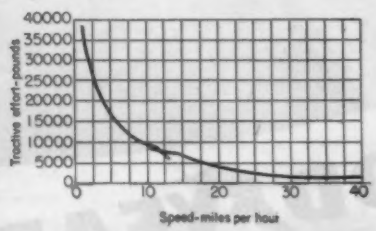
THE G-E 65-TONNER'S PULLING POWER

TRAIN RESISTANCE, 10 LB PER TON

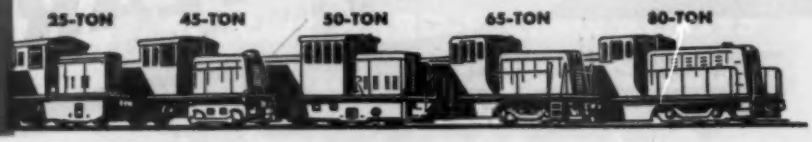
Speed (Mph)	Per Cent Grade						
	Level	0.5	1.0	1.5	2.0	2.5	3.0
2.0	2570	1250	616	506	463	375	312
5	1738	838	536	395	295	235	182
7.5	1180	580	352	250	185	143	113
10	935	434	288	184	134	101	77
15	630	282	166	108	73	50	34
20	384	159	84	47	34	—	—
25	212	73	27	—	—	—	—
30	103	18	—	—	—	—	—
35	36	—	—	—	—	—	—
40	—	—	—	—	—	—	—

TRAIN RESISTANCE, 20 LB PER TON

Speed (Mph)	Per Cent Grade						
	Level	0.5	1.0	1.5	2.0	2.5	3.0
2.0	1288	638	612	476	388	321	273
5	870	557	402	308	248	201	168
7.5	583	373	264	200	154	122	99
10	457	288	201	148	112	87	68
15	315	188	125	85	61	43	39
20	192	106	63	37	20	—	—
25	106	48	20	—	—	—	—
30	51	—	—	—	—	—	—
35	18	—	—	—	—	—	—
40	—	—	—	—	—	—	—



Hauling capacity is conservatively based on 20 per cent maximum running adhesion, thus allowing for starting trains. When the locomotive is used for switching or transfer service, there are no restrictions on the tonnages listed for speeds of 5 mph and higher. For loads that restrict speed to less than 5 mph, the maximum tonnage should be limited to that shown in the table; and movements should be confined to switching, unless transfer moves are less than one-half hour continuous duration.



That's why Marquette electrics

For four years, two G-E diesel-electrics have done all the Marquette Cement Mfg. Company's hauling and switching. This company previously relied on steam power, at one time operating as many as seven steam locomotives.

At the company's quarry at Earlham, Iowa, a 65-ton G-E diesel-electric was placed in service in 1941. It hauls three loaded standard railroad cars up a 3 per-cent grade for a quarter of a mile to a siding, each car weighing 75 gross tons. Then from the siding it takes the cars, in trains of 12 to 15 each, two miles to a Rock Island siding. From there the Rock Island Railway moves them to the company's cement mill in Des Moines, thirty miles away.

For the mill, a 45-ton G-E diesel-electric was also purchased in 1941. This 45-tonner does all the yard switching, including spottings of cars and coal handling. It easily handles as many as 25 cars at a time.

Marquette obtains this performance day in and day out because G-E diesel-electrics are available for work 95 per cent of the time, instead of only 60 to 65 per cent. Compared with steamers, diesel-electrics get more work done, in less time, at lower cost. Many a plant that is using steamers is really paying for diesel-electrics without enjoying their operating efficiency.

Why not have a G-E representative make a survey of your motive-power requirements?

APPARATUS DEPARTMENT

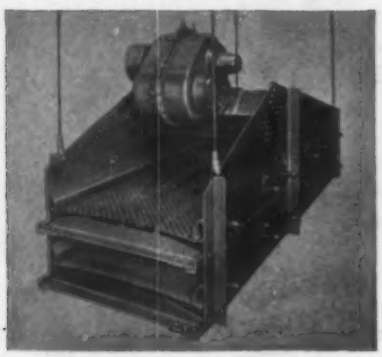
GENERAL ELECTRIC

SCHENECTADY, N. Y.

Buy all the BONDS you can — and keep all you buy

"LOW-HEAD"

HERE'S A MULTI-PURPOSE SCREEN THAT OPERATES HORIZONTALLY--SAVES SPACE, CUTS INSTALLATION COSTS!

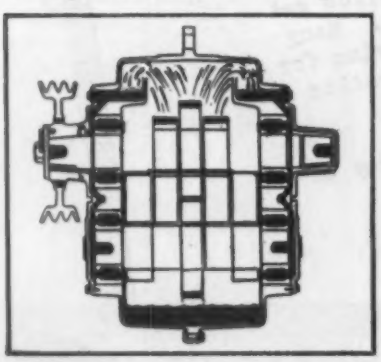


1 Want to remodel, but find that *inclined* screens require building changes? "Low-Head" Vibrating screens may be your answer. Reason: They operate *horizontally*—save headroom and space!

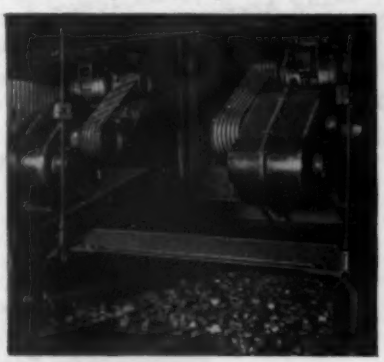
STRESS-RELIEVED
All stresses and strains removed after welding and before machining.
NOT STRESS-RELIEVED
Locked-up stresses tend to distort frame —cause early failure.

2 A-C guards against failure in the field by *"stress-relieving"* side plates and frames. That means *uniformly* strong bodies — the ability to *resist* damaging vibration year after year!

3 One user reports he's getting *up to double* cloth life! Good reason is A-C research in development of support frames with adequate strength and correct crown for different grades of surfaces.



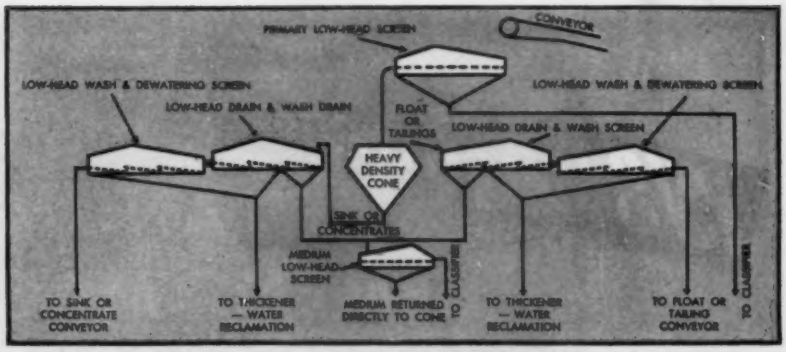
4 Operators like this compact mechanism—it's *easy* to inspect. And they don't worry about dust or oil. Mechanism is *totally enclosed*—gears and bearings are *continuously* splash-lubricated!



5 Two of many "Low-Head" screens speeding-up vital U.S. coal output. You'll find others at work on a wide range of products . . . from gravel and metallic ores to wood chips and foundry sand!

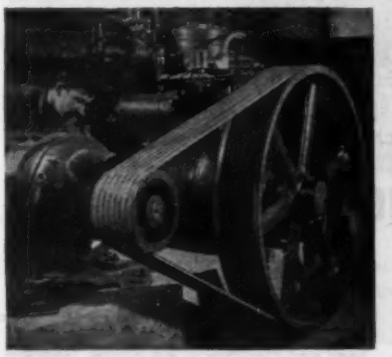
6 "Low-Head" screens are *versatile* —not only save you headroom, but can be used for wet or dry screening, dewatering, rinsing! For details on these modern screens, send for bulletin B6330.

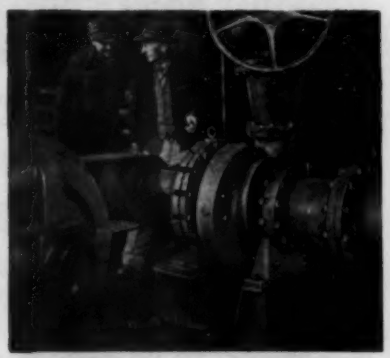
7 Here's A-C developed 'End-Tension" deck for Sink and Float processes. It's *one* example of how A-C cooperates with Sink and Float companies—offers its experience to their progress.



8 Schematic sink-float flow sheet showing "Low-Head" screens with "End-Tension" decks. Pool washing features of the new decks, effect important economies in total water consumption.

9 Horizontal operation plus new "End-Tension" decks also assures maximum recovery of medium; efficient washing of medium adhering to ores; thorough dewatering of concentrates, tailings.





10 A-C is the *only* company that builds basic processing equipment *plus* motors, controls, Texrope drives. That means *unit-responsibility*—no "buck-passing"!

11 Planning ahead for more efficient power distribution in your plant? This scale model "Unit Substation Builder Set" can help you plan *visually*—saves time!

12 New type "CW" Pump lowers cost-per-ton of *solids* handled over similar units—is representative of performance on other A-C pumps rated from 10 to 150,000 gpm.

YOU CAN DEPEND ON A-C RECOMMENDATIONS!

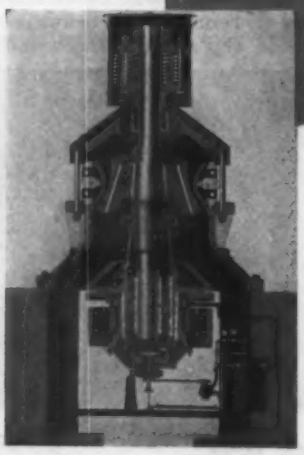
Allis-Chalmers builds *all* types—not just one or two—of basic processing equipment. When you need screens, for example, you can select from 4 types, 8 different styles. Same holds true for crushers, grinding mills . . . almost *everything* A-C builds! What does this mean to you? For one thing, *greater choice*—assurance that the equipment A-C recommends will be suited to the *exact* job to be done . . . isn't just an *improvised* way of doing it! 1881

ALLIS CHALMERS

MILWAUKEE 1, WIS.

KVS Engineering

LANDMARKS *in* CEMENT MACHINERY MANUFACTURE . .



THE excellent results cement manufacturers secure from Kennedy machinery is not attributable to the type machine alone. Of outstanding importance is the thorough and varied experience Kennedy engineers have gained in the design and manufacture of machinery for the cement plant—experience that has contributed such outstanding improvements in cement machinery as the Gearless Crusher, the Integral Gear-Driven Tube Mills, Rotary Kilns, Burners, Pneumatic Transport Systems, and other machinery.

KENNEDY BALL BEARING GEARLESS CRUSHERS

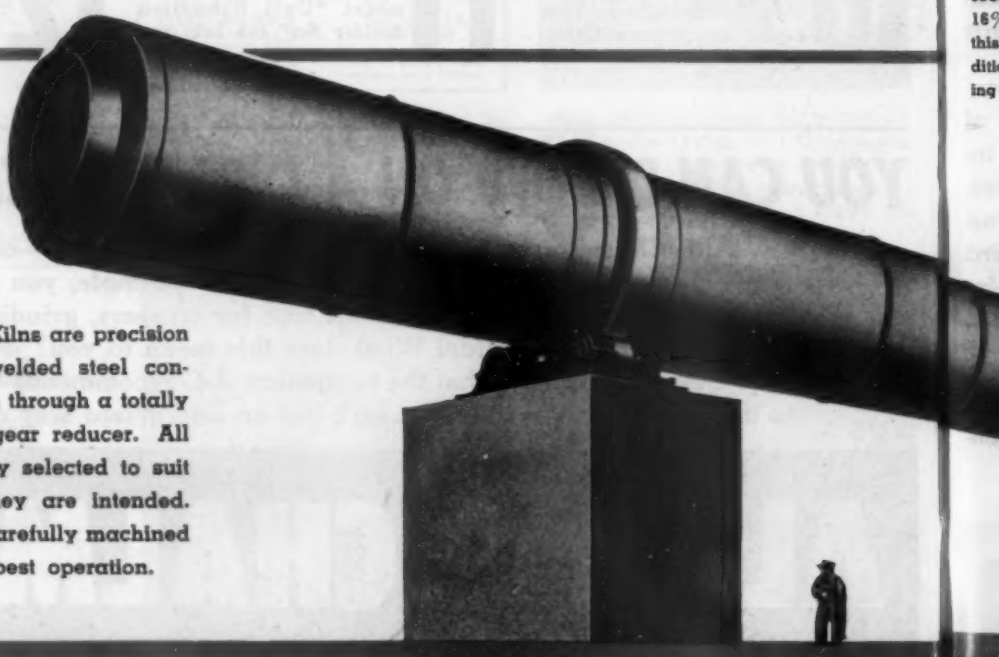
This Kennedy improvement in the gyratory-type crusher is saving up to 80% in maintenance costs and 50% in power costs over geared crushers among manufacturers who have installed it.

A snychronous motor built right in the pulley assembly drives the crusher. Power loss through belts or gears is thus eliminated. The motor runs on ball bearings and is continuously lubricated by a force feed lubrication system.

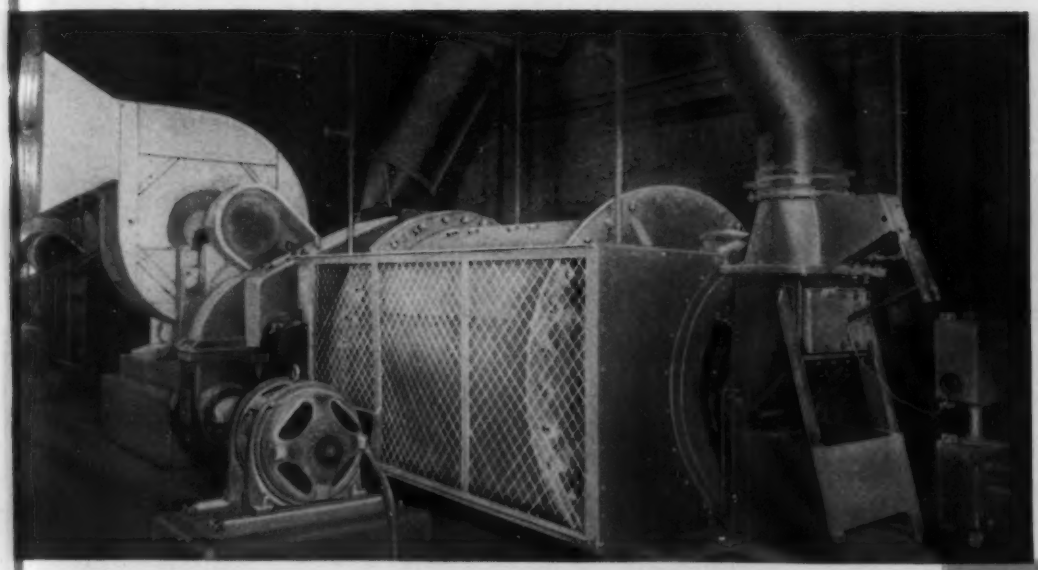
Our No. 49 crusher has produced 156 tons per hour when set to 7/16" between the head and concaves at the bottom. Gearless crushers are built in a wide variety of capacities, as standard type, short shaft, and low head gyratory crushers.

KENNEDY ROTARY KILNS

Shown here is a Kennedy 10'x9'x250' rotary kiln mounted on four riding rings. Kennedy Kilns are precision manufactured—of all-welded steel construction and are driven through a totally enclosed herringbone gear reducer. All materials are especially selected to suit the work for which they are intended. All wearing parts are carefully machined to ensure true-fit and best operation.



KENNEDY-VAN SAUN MFG. & ENG. CORPORATION



5,000 LB. OF PULVERIZED COAL PER HR. TO A FINENESS OF 88% TO 90% THROUGH 200 MESH ON EACH OF FOUR KENNEDY INTEGRAL GEAR DRIVEN TUBE MILLS

Part of the efficient kiln firing operations of a large Eastern cement manufacturer are four 5'x6' Kennedy Air Swept Tube Mills, one of which is shown here. Of the patented Kennedy Integral Gear-Driven type, these mills are equipped with expansion type classifiers, and receive their pre-heated air from the clinker cooler in order to be able to handle coal up to 16% moisture. After four years of operation this concern placed a repeat order for five additional mills to be used in other plants belonging to it.

The Kennedy Integral Gear-Driven Tube Mill is the most advanced and versatile type made today. It is being used as rod mill, and ball mill —for wet and dry grinding and for air sweeping. Its patented design enables the motor to be direct connected to the high speed shaft by double reduction herringbone gears or noiseless worm gear—a feature which greatly reduces the power required to drive the mills.

KENNEDY BURNERS

have received careful study by KENNEDY Engineers for this important part of your calcining system. Our Engineers adapt the burner for your individual installation out of the types we manufacture to give you maximum burning efficiency.

GET YOUR COPY
of our new 87-page Bulletin Number 44-B, "Radiant Heat from Air Floated Pulverized Coal."

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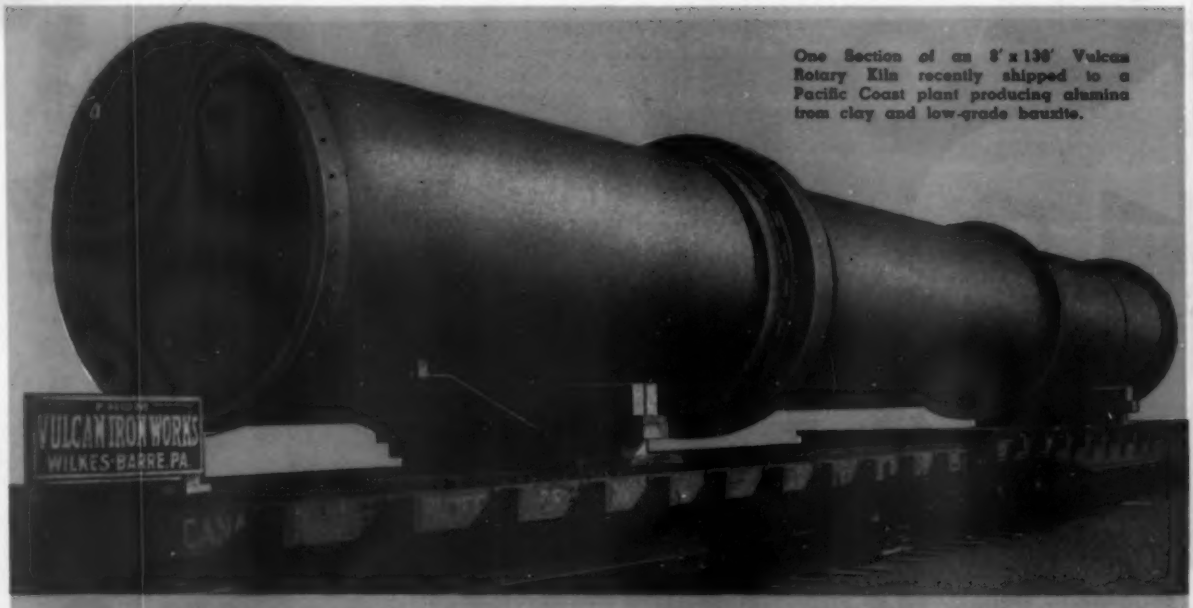
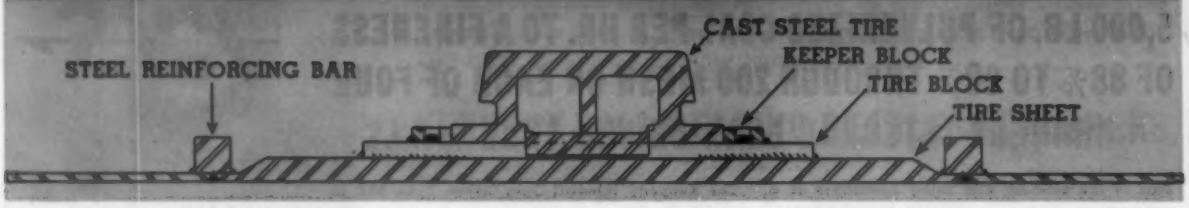


One Section of an 8' x 130' Vulcan Rotary Kiln recently shipped to a Pacific Coast plant producing alumina from clay and low-grade bauxite.



THIS PATENTED RIVETLESS TIRE MOUNTING Cuts Maintenance Costs on Vulcan Rotary Kilns

The longer a Vulcan Rotary Kiln is operated the greater the savings secured—because of its very low costs for maintenance and repairs. Fifty years of continuous experience in the design, manufacture and servicing of this type of equipment has taught our engineers where operating troubles are most apt to occur and how to prevent them.

A typical example of Vulcan Trouble-Preventing Kiln Construction is the patented rivetless tire mounting shown above. Not only does it completely eliminate the rivet-popping once considered inevitable but its distinctive combination of interlocking lugs and blocks absolutely prevents creeping of the tire in any direction.

Another important advantage is the use of ONE THICK PLATE beneath the tire, instead of several relatively thin plates, thereby improving heat-conductivity and overcoming the former tendency toward burning or bulging of the shell and reinforcing bands at these particular points.

Write us regarding any manufacturing or processing problems within the scope of the equipment listed below. No charge or obligation for estimates, constructive suggestions and preliminary designs.

VULCAN IRON WORKS

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Main Office and Works **WILKES-BARRE, PA.,** New York Office 50 Church

Rotary Kilns, Coolers and Dryers	Toothed, Double-Roll Crushers	Heavy-Duty Electric Hoists	Steam Locomotives
Rotary Retorts, Calciners, Etc.	High-Speed Hammer-Type Pulverizers	Self-Contained Electric Hoists	Diesel and Gasoline Locomotives
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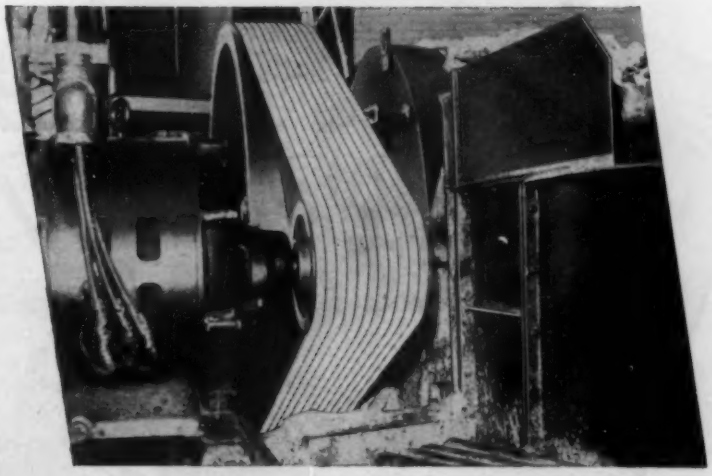
GATES VULCO ROPES



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To meet the unprecedented severity of combat service on U. S. Army tanks, tractors and self-propelled big guns, Gates developed and built V-Belts *far superior* to any that were ever built before--and here is why this fact is important to YOU:—

✓ **Every improvement developed by Gates for these Army V-BELTS has been added, day by day, to the quality of the standard Gates Vulco Ropes which have been delivered to you.**

You have not had to wait until after the war for these improvements for the simple reason that more efficient V-Belts have been an important factor in increasing essential war production. That is why your standard Gates Vulco Ropes are today the best V-Belts that have ever been delivered to you.

In addition, where V-Belts of special construction are required, your Gates Rubber Engineer is in position to supply a Gates Vulco Rope that is especially engineered to meet your special needs. You need only pick up your phone book and look under the heading "Gates Rubber." The Gates Rubber Engineer will bring to you, right in your own plant, the very latest advances in V-Belt construction and in drive operation as well.

and NOTE THIS:—

Gates also makes these special belts to meet exceptional service needs.

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All Gates V-Belts are Built With *The Patented* **CONCAVE SIDE**

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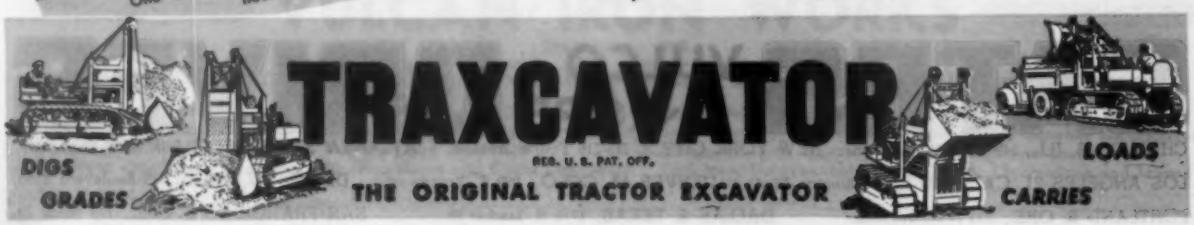
PLAN FOR BETTER EQUIPMENT, TOO!

Model T4 TRAXCAVATOR removing overburden at a California quarry

The T4 TRAXCAVATOR loads 500 tons of limestone per day in this Iowa pit

One of two T4's that load as much as 75 tons per hour each in this Kansas limestone mine

YOUR plans to reduce production costs will get off to a flying start if you decide to TRAXCAVATE, for it's the modern material handling method that has enabled many other pits and plants to cut costs. TRAXCAVATORS, the dependable tractor excavators, combine in one machine the usefulness of many — will strip overburden, load from pit or stockpiles, carry and stockpile, maintain haulage roads, remove snow, do drawbar work. There's a wide choice of models with bucket sizes from ½ to 2½ cubic yards. Your TRACKSON-"Caterpillar" dealer will be glad to give you the complete facts, or write to TRACKSON COMPANY, Dept. RP-105, Milwaukee 1, Wis.



MULTIPLE ENGINES PROVED on the job

Diesel power for variable loads, through multiple-engine hook-ups, is nothing new with "Caterpillar." Fourteen years show hundreds of such "Caterpillar" Diesel installations, in all types of industries, where their advantages are being proved daily.

In the installation pictured here, two "Caterpillar" Diesel D8800 Engines are belted to common shafting for driving a limestone pulverizer.

Either engine can be cut out for "running light"—with the usual throttle control providing further flexibility for matching the needed power precisely to the load. The advantages are obvious:

You waste no fuel. You have constant standby power—continued operation, even while one engine is being serviced or repaired. You have no heavy installation or rigging-up expense. For your power-plant is readily portable—in convenient "packages" instead of a ponderous single unit of similar total capacity.

And, "Caterpillar" Diesel Engines have still other advantages—individually: Through highly efficient air, oil and fuel filters, and inbuilt seals, all vital parts are thoroughly protected against dust, dirt and grit. Fuel and maintenance costs are amazingly low. Stamina and long life are definite "Caterpillar" qualities.

• SIX SIZES — 34 to 190 hp. — applicable to multiple hook-ups of 2 to 20 units — in many combinations of sizes.

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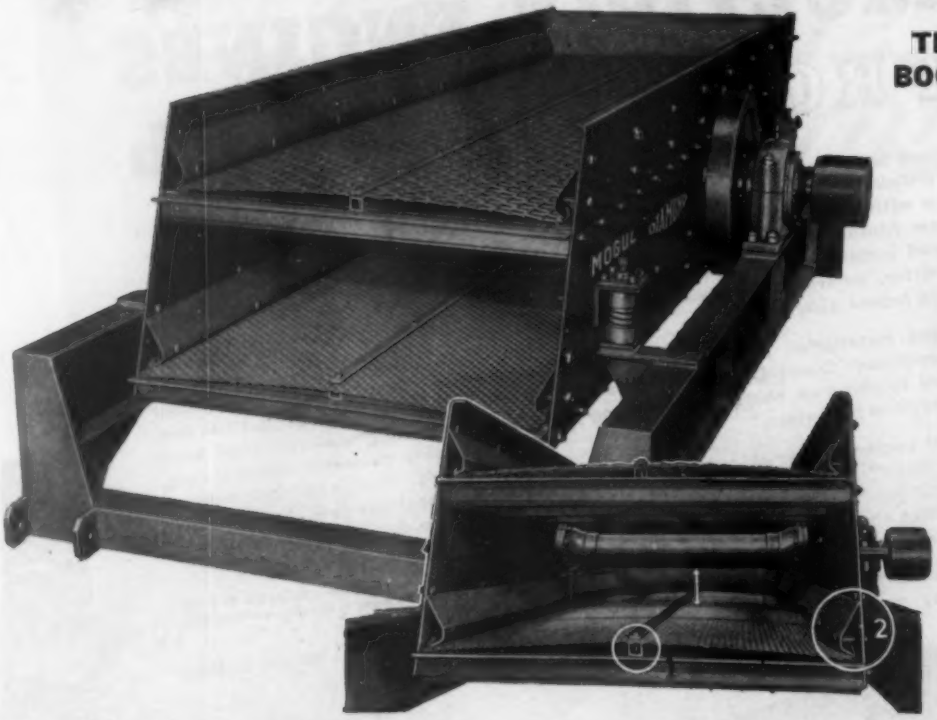
CATERPILLAR DIESEL ENGINES

TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

The discharged veteran wears this emblem. Remember his service and honor him.

YOU CAN'T CHOKE A DIAMOND VIBRATOR!



THIS NEW FREE BOOK TELLS WHY

It tells you the many reasons for the acknowledged superiority of the DIAMOND vibrator, and it tells you more. It illustrates and describes DIAMOND scalping and combination scalping and scrubbing screens, and DIAMOND drag washers. Send to us, or ask your DIAMOND dealer for a copy of Bulletin D-45-V.

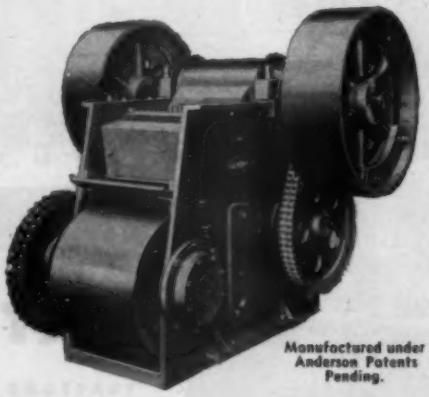
Look at the illustration above. Study it. Note the free space between decks, even with the shaft housing, as denoted by the white arrow. This gives the material the room it needs. The marvelously balanced *forward* action of the screen keeps the material moving from the feed end to the open end. Figure 1 shows how the screen on each deck is raised in the center to force the material to spread towards the sides. Users will invariably tell you that they consistently "get more material through their DIAMOND vibrators" which means greater capacity, important savings in time, and consequent savings in operating costs.

Figure 2 shows the DIAMOND method of screen locking. Here, the curved side plate holds the turned edge of the screen, and tightening bolts pulling straight out draw the screen taut without the constant cutting action so often found with other methods. This means considerably less screen replacement. Bulletin D-45-V fully illustrates and describes these and other important features. Ask for it.

ASK YOUR DIAMOND DEALER ABOUT THE NEW "DUAL-ACTION" CRUSHER

Get the facts about this startling new development in crushing. A primary (jaw) and finishing (roll) crusher in ONE UNIT! About half the weight, equal or greater capacity, dependable uniformity of product—these and other features make "DUAL-ACTION" the outstanding development in crushing in the past thirty years. Ask for Bulletin D-45-M which gives all the facts and information on the use of the "DUAL-ACTION" for replacement on your present used plant bringing its weight well within minimum load limits anywhere on any highway. Other dependable DIAMOND products are:

Jaw and roll crushers . . . Conveyors, screens . . . Bucket elevators . . . Feeders, hoppers, bins . . . Portable, ROTORLIFT plants . . . Complete quarry plants.



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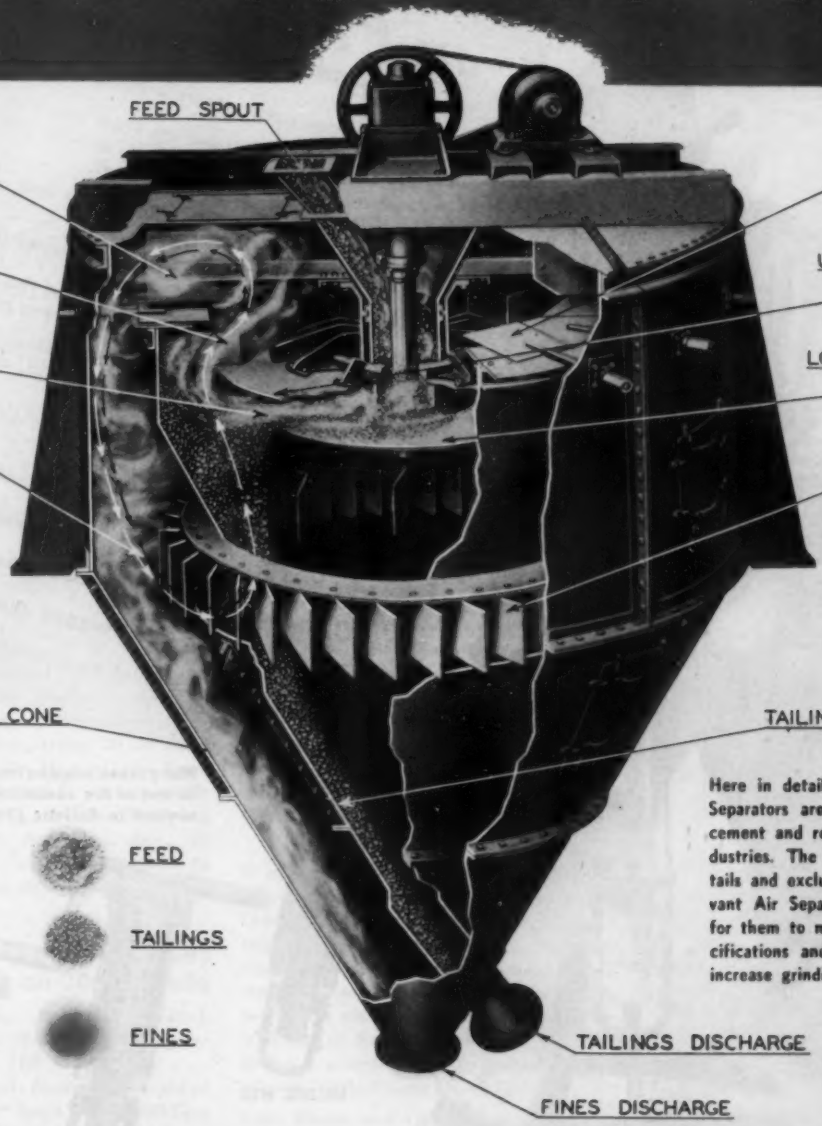
The Action of a
STURTEVANT AIR SEPARATOR



Here in detail is why Sturtevant Air Separators are the most-used in the cement and related rock products industries. The carefully engineered details and exclusive features of Sturtevant Air Separators make it possible for them to meet more exacting specifications and at the same time to increase grinding mill capacities.

- Produce finenesses ranging from 40 to 350 mesh.
- Handle ¼ to 50 tph while increasing mill capacity as much as 300%.
- Control specific surface area of materials handled.
- Lower mill and product temperatures.
- Feed opening hopper constructed to permit handling larger tonnages.
- Quickly adjustable to an infinite variety of adjustments

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12 reasons why CLEVELAND SINKERS are PREFERRED...

1. Drop forged construction insures super-strength.
2. End-seating valve (used on most models) improves with use, prevents greater air consumption with long wear.
3. Big oil reservoir holds enough for four hour's steady operation.
4. Lubrication of rifle nut and bar prolongs their life 50%.
5. Complete lubrication of all parts of the machine insures longer wear of all moving parts.
6. Chrome plated spacer wears 3 times longer, insures full cushion on front end, avoids piston and side rod breakage.
7. Large areas of face contact hold parts in line, minimize wear at joints.
8. Floating chuck clutch prevents binding of piston.
9. Well designed exhaust port prevents freezing.
10. Throttle detents fully enclosed and well oiled.
11. Four pawl rotation—rugged and reliable.
12. Goose neck swivel air connection.

Many types, ranging from 32 to 78 lbs. in wet or dry construction, fully described in Bulletin 122. Ask for it!

MODEL H111

MODEL H10

MODEL H66

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TOURNAPULL contractor strips 40′ overburden for MARQUETTE CEMENT CO.

General view of Earlham Quarry where Tournapulls load overburden, haul and dump in mined-out pit area in background. Note tough digging and slippery footing . . . loads are still heaped in 100 to 125 feet.

BOOTH & OLSON, Inc. uses 5 Tournapulls to strip tough, wet clay on 500,000 cu. yd. job

6 to 8 feet of silt, 2 to 3 feet blue clay hardpan and 30 feet of slippery, wet yellow clay overburden makes stripping a tough job at the Marquette Cement Company limestone quarry, near Earlham, Iowa. Further, steep 20 to 30% haul road down the face of the limestone bank and long 6% return grade add to production problems. Stripping contractor, Booth & Olson, Inc., of Sioux City, Iowa, found Tournapulls to be the answer on this tough 500,000 cu. yd. job.

Tournapulls Average 9 Trips per hour each on 3000′ Cycle

Working in slick, sticky clay, which tends to ball up, the Tournapulls are pusher loaded in 100 to 125 feet . . . average 9 trips of load, haul, spread and return every hour on 3,000-foot round trip haul. On the dump, LeTourneau positive ejection tailgate wipes the Carryall bowl clean . . . spreads the wet gummy clay in even layers. There are no stuck-in yards hauled back to the cut. Big rubber tires — plus powerful Tournapull 2-wheel design — give ample flotation and traction needed in the cut, on the spoil bank and to negotiate steep, slippery grades.

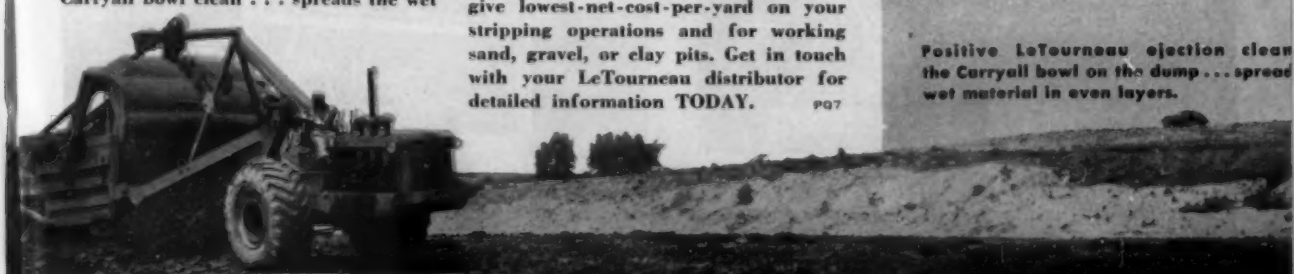
Tournapulls Drive in from Omaha

3 of these modern Scraper rigs were driven to the job under their own power from Omaha . . . made the 125-mile trip in 9 hours driving time . . . another time and money-saving advantage. Tournapull pit-to-pit moves over public highways with no extra shipping expense or waiting for flat cars or highway trailers, make it practical for stripping a series of pits located some distance apart.

Like Booth and Olson, you'll find that Tournapull s' ability to handle tough materials, their speed and mobility will give lowest-net-cost-per-yard on your stripping operations and for working sand, gravel, or clay pits. Get in touch with your LeTourneau distributor for detailed information TODAY. PQ7

(Below) Tournapulls safely negotiate 20 to 30% grade on haul down to quarry floor

Positive LeTourneau ejection clears the Carryall bowl on the dump . . . spreads wet material in even layers.



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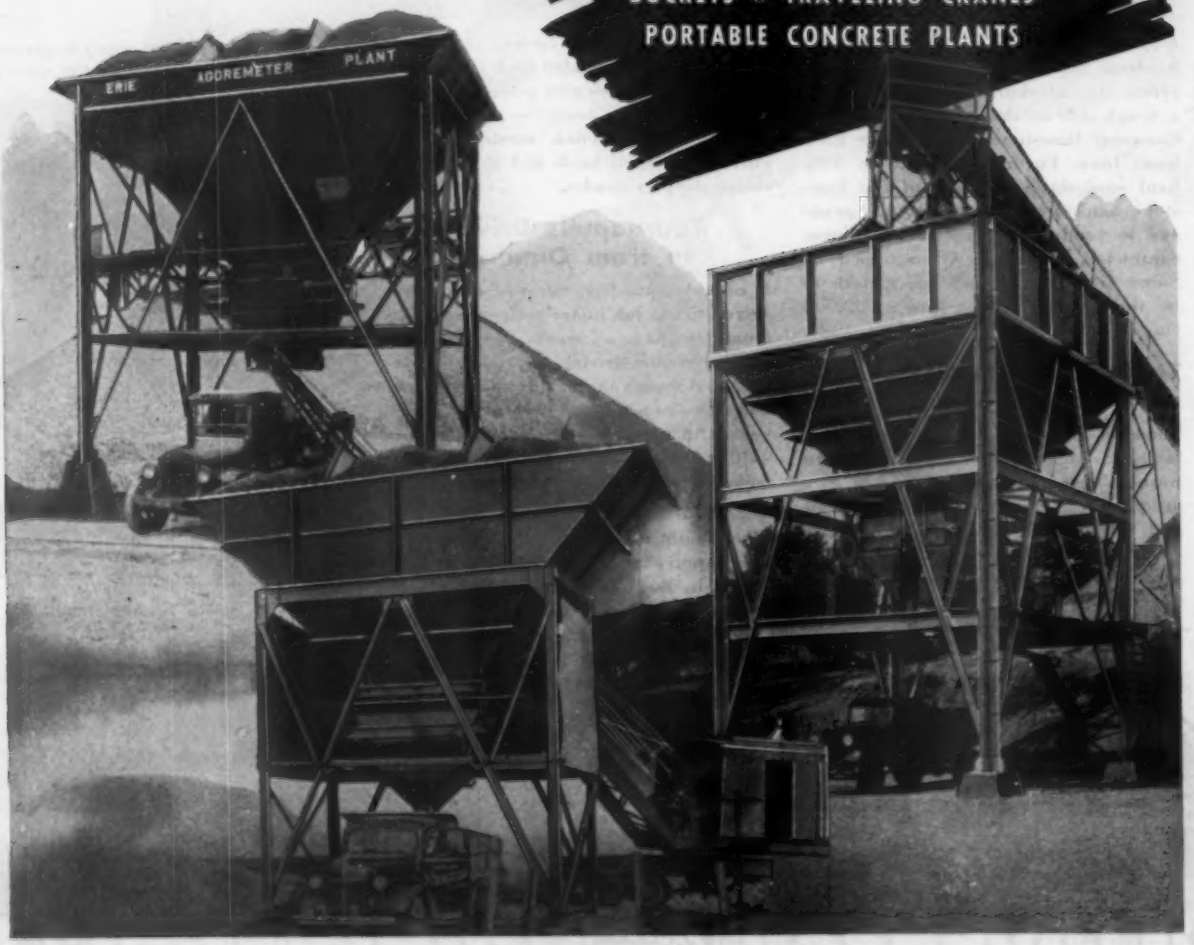
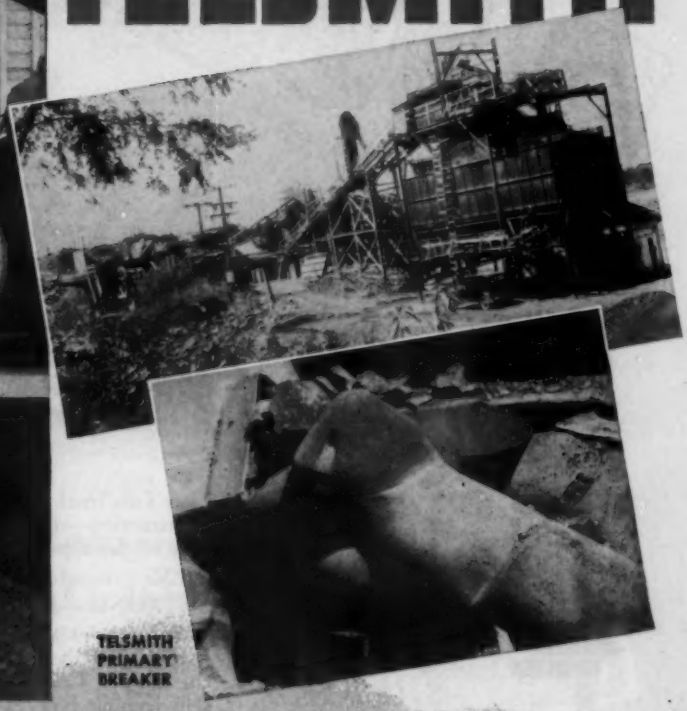


BUILD IN *Increased Production and Lower Costs* WITH TELSMITH

TELSMITH GYRASPHERE CRUSHER



TELSMITH PRIMARY BREAKER

• The quarry plant of Abraham Cleason, Sodus, N. Y., is already effectually serving its expanding peacetime market for finer products—at a profit—now turning out 125 tons per hr. at full capacity.

This plant's *increased production,* particularly in the smaller sizes, was precisely planned—with the expert help of Telsmith engineers. And then *built in* with the right Telsmith equipment.

To be specific—a 36 in. Telsmith Gyrasphere Secondary Crusher . . . with special concave for fine crushing . . . was added to the plant to handle the tailings and the excess of larger sizes. These are recrushed to minus ½" plus ¼" (N.Y. #1) and minus ¼" plus ⅛" (N.Y. #1A) sizes—at top tonnage—with very low power and upkeep costs!

An all-around production booster has also been added—a Telsmith 4' x 12' Heavy Duty Apron Feeder built to take the heaviest loads the trucks can dump on it. And it's cutting maintenance costs right and left—on conveyors, crushers and screens. The original plant had a 13-B Telsmith Primary Breaker. With its higher speed, faster feeding and bigger capacity, it has been proving itself a low-cost producer for a long time.

Telsmith's 40 years of engineering know-how is at your disposal. Consultation involves no obligation. Send for Bulletin Q-11.

Q-11

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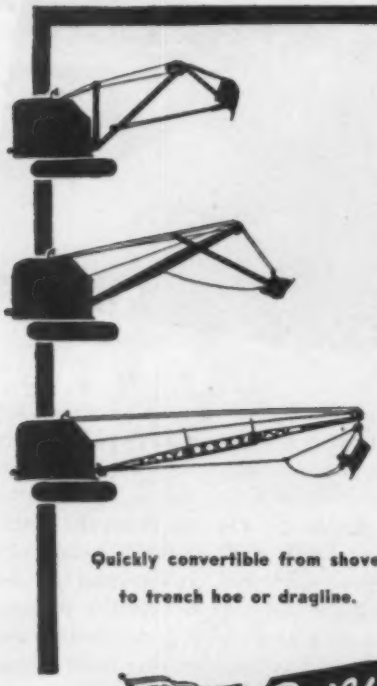
Cable Addresses: Smgworks, Milwaukee—Concrete, London

51 East 42nd St. New York 17, N. Y. | 211 W. Wacker Drive Chicago 6, Ill. | 713 Commercial Trust Bldg. Philadelphia 2, Pa. | 247 Third Street Cambridge 42, Mass. | Boehck Eqpt. Co. Milwaukee 3, Wis. | Mines Eng. & Eqpt. Co. San Francisco 4—Los Angeles 14

Brandeis M & S. Co. Louisville 8, Ky. | Rish Equipment Co. Charleston 22, & Clarksburg, W. Va. | Rish Equipment Co. Roanoke 7, & Richmond 10, Va. | North Carolina Eqpt. Co. Raleigh and Charlotte 1, N.C. | Wilson-Weesner-Wilkinson Co. Knoxville 8, & Nashville 6, Tenn.



Quickly convertible from shovel to trench hoe or dragline.

Here's the truck and crawler assembly of a Buckeye Clipper. Its rugged construction—simple design—assures a far greater service life—less time out for repairs.

BIG — treads are 22 inches wide with 9 inch pitch!

STRONG — both treads and sprockets are of heat-treated, alloy steel!

The crawler assembly — built in its entirety in the Buckeye shops — is typical of the superior design and construction found throughout the Clipper. Crawler is the well-known Buckeye patent, non-clogging, self-cleaning type. Tapered roller path below swing gear supports weight of machinery deck — stress and side play are removed from center pin.

Added to the inbuilt qualities of stamina, high productivity and low cost operation is the exclusive "Mevac" system — metered vacuum power control — similar to that used for years on big highway trucks. "Mevac" reduces operator fatigue to a minimum — all shovel functions respond to a flick of the operator's wrist on the short "Mevac" control handles. Send for 24-page illustrated booklet, "The Age of the Clippers," and learn how these easy-to-operate ½ and ¾ yard shovels can help you cut costs in your postwar operations.

Built by Buckeye

Buckeye Traction Ditcher Co., Findlay, Ohio

...a peek into the future—

3 Great New Cedarapids Tandem Straightline Gravel Plants for Tomorrow's Jobs

for BIG Jobs—*The Master*
MEDIUM Jobs—*The Junior*
SMALL Jobs—*The Baby*

THREE new Cedarapids plants, differing only in size, will be ready for work on your 1946 contracts. Engineered and job-tested to rigid Cedarapids performance and economy standards, they will give you the production margin to make low-bid contracts show a good profit.

Check These Cedarapids Features:

Complete Single-Unit Portability. Fast set-up and take-down. On contractor's job tests, less than one-half hour to put the Junior Tandem into profit-making production!

Balanced High Capacities. Careful synchronization of conveyor speeds with screening, roll and jaw crusher capacities assures smooth, continuous operation at top efficiency.

Adaptability. Readily adaptable to any job conditions. Easy to convert into a complete Cedarapids Unitized Plant with primary crusher and washing and screening plant.

Extra Belt, Screen and Crusher Capacities for the tough jobs and hard-to-work materials.

Centralized Control. One man on control platform handles production.

Uniform Aggregate. Straightline Tandem design simplifies processing, insures aggregate to meet exacting specifications.

Low Maintenance. Rugged Cedarapids construction and easy access for greasing and adjustments keep maintenance costs at a minimum.

See your nearby Iowa distributor for complete details on these new Cedarapids Tandem Straightline Plants, or write direct.

IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa

Cedarapids

Built by IOWA

THE IOWA LINE

of Material Handling Equipment Includes

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS—STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS—TRAPS
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

AUGUST 1945 – the history making month

Reconversion was no problem at QUAKER— August 17th, Quaker was producing civilian articles

INDUSTRIAL RUBBER PRODUCTS that Quaker is making NOW for civilian use

(PARTIAL LIST ONLY)

- Transmission Belting
- Agricultural Belting
- Conveyor Belting
- Elevator Belting
- Air Drill Hose
- Chemical Hose
- Creamery Hose
- Fire Hose
- Fuel Oil Hose
- Garden Hose
- Gasoline Hose
- Tank Car and Tank Truck Hose
- Sand Blast Hose
- Spray Hose
- Steam Hose
- Suction Hose
- Oil Suction and Discharge Hose
- Water Hose
- Road Contractors' Hose
- Welding Hose
- Tubing
- Rod Packings
- Sheet Packings
- Gaskets
- Washers
- Pump Valves
- Moulded Articles

Four eventful days!

August 14th, the ending of the most devastating war in human history. August 15th and 16th—days of triumph and jubilation. August 17th reconversion in full swing.

Sure, we received cancellations on Government orders and we were glad to get them. Now materials and products can be used for civilian purposes.

There is very little difference in the manufacture of Industrial Rubber Goods, whether for use in peace or in war. Quaker has no changes to make in dies, presses, moulds or heavy equipment. Cancellation of war products, makes very little interference with our factory production.

Practically all production can now be used on civilian orders which will make for quicker shipments.

Keen buyers, with an eye on the future, will do well by placing their orders in advance of requirements to insure getting material when desired. It will be several months before critical raw materials, especially cotton yarns and ducks will be available in quantities wanted. Anticipate your needs and send your orders to Quaker NOW.

"If there is a way to get it done—Quaker will do it"

QUAKER RUBBER CORPORATION

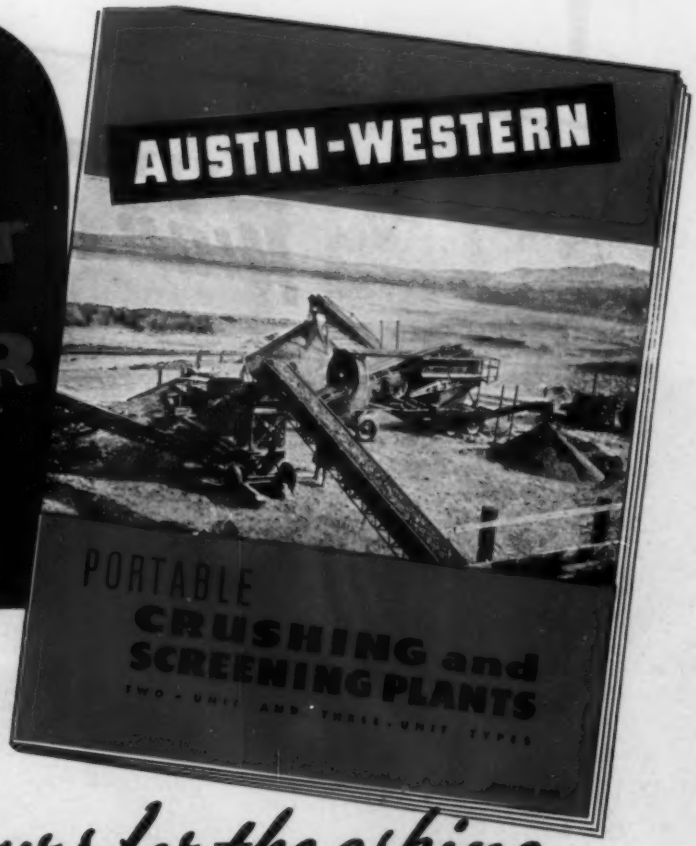
PHILADELPHIA 24, PA.

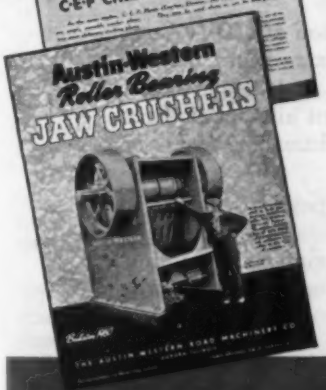
NEW YORK 7 • CLEVELAND 15 • CHICAGO 16 • HOUSTON 1

Western Territory: QUAKER PACIFIC RUBBER COMPANY

SAN FRANCISCO 5 • LOS ANGELES 21

Guides to Greater POSTWAR Profits





Yours for the asking.

Copies of any or all of these interesting and informative bulletins. Ask for each by its number.

1999 Two-Unit and Three-Unit Crushing Plants . . . . . 1960 Jaw Crushers
1991 C. E. P (Crusher, Elevator, Power) Plants . . . . . 1993 Roll Crushers

● The Post-War demand for crushed aggregate for highway and all other forms of construction will be tremendous. Austin-Western is ready for present and Post-War demands with job-tested equipment, including:

Jaw Crushers and Roll Crushers in a wide range of sizes; plus matching screens, elevators, conveyors and bins.

Portable Crushing Plants, from the smallest to the magnificent Two-Unit and Three-Unit Plants which combine maximum output and variety of specification on the one hand, and maximum economy of operation on the other; giving the owner flexibility of operation that spells maximum profits.

Your nearby Austin-Western dealer will be glad to recommend the plant best suited to your needs.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U.S.A.

BUILDERS OF ROAD MACHINERY
Austin-Western
SINCE 1859

BUY MORE WAR BONDS

HOW B-G CONVEYORS ACHIEVE *HIGH* CAPACITY AT *LOW* COST!

• You can stockpile material with less equipment, less horsepower, and less cost than by any other method when you use a Barber-Greene Portable Conveyor.

Capacity is high because material is kept on the move—*continuously*. B-G Conveyors handle the maximum output of crushers easily . . . help you make the most of limited space. Swiveling trucks permit storage in a large semicircle without disturbing the original installation.

To bring your stockpiling costs still lower, this same B-G Conveyor can be used to reclaim your pit and quarry products when the time comes.

If frequent setups, knockdowns, and rearrangements are required, you'll find, too, that a B-G Portable Conveyor saves time, labor and expense.

The sturdy construction of a B-G Conveyor gives you many extra years of service. Standardization of parts assures you of correct and permanent alignment. Belt life is prolonged . . . maintenance costs are negligible.

There are many types and sizes of Barber-Greene Conveyors, portable and permanent, for every material handling job. Barber-Greene Company, Aurora, Illinois.

Barber-Greene *Constant Flow Equipment*

HYSTER proudly presents the

HYSTAWAY

...A DRAGLINE, CLAMSHELL AND CRANE COMBINATION *for use with Track-Type Tractor and Bulldozer...* ALL IN ONE WORKING UNIT

Multiplies the production use of your "CATERPILLAR" DIESEL TRACTOR...

- ✓ **SIZES.** Available for the "Caterpillar" models D6, D7, D8.
- ✓ **DRAGLINE AND CLAMSHELL.** Handles (on a D7) ½ cu. yd. dragline bucket; ⅜ cu. yd. digging clamshell or ½ yd. rehandling clamshell. Other models in proportionate capacities.
- ✓ **CRANE.** Swinging live boom, with maximum lifting capacities in any position.
- ✓ **MOUNTING.** On in 2 hours (with 2 men); off in 1 hour.
- ✓ **MOBILITY.** Full tractor mobility is retained. Crawler track oscillation is not impeded. Tractor rigidity when desired is accomplished by crank control at masthead.
- ✓ **OPERATION.** Conventional shovel and crane controls. 240° swing at speed of 4.5 RPM.

THIS is the most important product announcement Hyster Company has made in the 16 years we have specialized in building tractor equipment.

The addition of a Hystaway to a "Caterpillar" track-type tractor gives you *one piece* of production machinery that combines tractor—bulldozer—dragline, clamshell and crane.

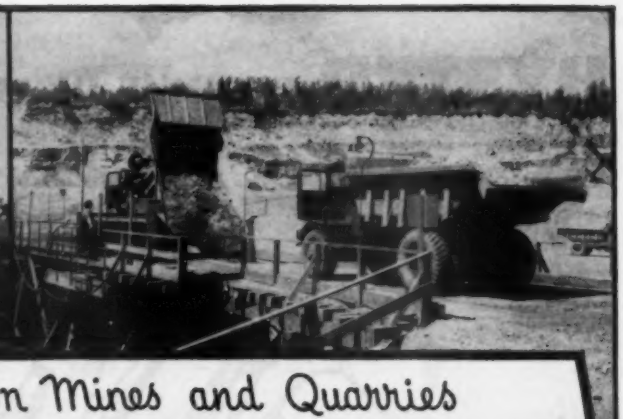
Back of Hystaway lies the best engineering skill in the tractor equipment business. Years of field tests in various sections, under all working conditions, have proved Hystaway's performance, stamina, versatility.

READY. Completely illustrated booklet on Hystaway—how it's built—what it does—how it does it. Write for your copy.

Sold and serviced by "Caterpillar" dealers and distributors throughout the world.

HYSTER COMPANY

2938 N.E. Clackamas, Portland 8, Ore.
1838 North Adams, Peoria 3, Illinois



In Mines and Quarries

EUCLIDS

move thousands of **EXTRA** tons every month

● Built for tough off-the-highway hauling, Rear-Dump and Bottom-Dump EUCLIDS have stepped up production noticeably and reduced hauling costs on scores of open-pit mining and quarry operations. Here are some of the more important reasons for the *plus* performance of Euclids:

Rugged simplicity — Designed for dependable performance as well as appearance, there are fewer wearing parts; maintenance costs and down-time for repairs are reduced to a minimum.

Capacity — Euclid models have payload capacity ranging from 15 to 30 tons; favorable ratio of unit weight to payload capacity means more pay tons hauled on every trip.

Speed — top speeds loaded of 21.8 to 34.4 m.p.h., depending on model; fast travel time results in many more pay load trips per hour than can be made with slower equipment.

Versatility — Efficient for hauling any material on any length haul; handle overburden, rock, coal, ore and other materials loaded by shovels, draglines, transfer bins, mobile loaders and other modern digging and loading equipment.

If you are interested in increasing your production and profits, check Euclid performance on any job, and write for complete information.

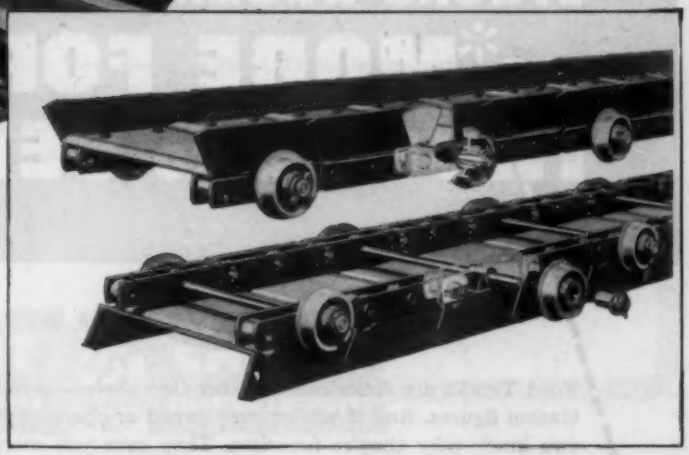
The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

EUCLID SELF-POWERED HAULING EQUIPMENT For EARTH ROCK COAL ORE

HOW TO STOP "Leaks" IN YOUR Handling Systems!

① YOU CAN STOP WASTEFUL LEAKAGE and spillage in handling heavy bulk materials with Rex Leak-proof Apron Conveyors. They can help you step up the flow of bulk materials—increase plant operating efficiency at lower costs.

② EFFICIENT MASS MOVEMENT of ore, coal, rock, stone, gravel, sand, chemicals and other bulk materials can be handled smoothly and economically on rugged, dependable Rex Leak-proof Apron Conveyors. Easy to install, they can be used as incoming supply feeders —outgoing feeders to other units—or as long horizontal or inclined conveyors. Capacities range from a few to hundreds of tons per hour.



③ REX EQUALIZING SADDLES and outboard rollers keep the load moving without stops or costly shutdowns. Cutaway view shows Rex Leak-proof Apron Conveyor equipped with Rex Chabelco Steel Chain and equalizing saddles. Note how pulling load is applied only at center line of each chain to avoid eccentric side loads. The outboard rollers, with bushings, carry the entire load independent of chain. Welded pan design eliminates side leakage. These are but *few* of the many advantages you get with Rex Leak-proof Apron Conveyors.

* * *

Rex maintains a staff of experienced materials-handling engineers who can help you with any problem you have involving the efficient and economical moving of materials. Why not let them help you? There is no obligation. Write Chain Belt Company, 1649 W. Bruce St., Milwaukee 4, Wisconsin.

REX **APRON CONVEYOR**

For Efficient Handling of Bulk Materials

CHAIN BELT COMPANY OF MILWAUKEE

Rex Chain Belt and Transmission Division, Rex Conveyor and Process Equipment Division, Milwaukee 4, Wisconsin • Baldwin-Duckworth Division, Springfield 2, Massachusetts

MORE MODELS IN PRODUCTION . . . 1,000 A DAY COMING!

You SEE more Ford Trucks because there are MORE FORD TRUCKS to SEE!

100 H.P. V-8 Ford 90 H.P. SIX

Ford Trucks are America's Number-One choice—proved by registration figures. And if you've ever owned or operated Ford Trucks you know *why* they're favorites. They save you money—in first cost, operating cost, maintenance cost. They are reliable, durable, simple and easy to service. Wherever you go, there's competent Ford service. There's a Ford Truck among the 42 current models and types that will do a good, efficient, economical job for you. Ask your Ford Dealer to tell you about the many new engineering advancements, and the latest priority regulations.

YEAR AFTER YEAR, OFFICIAL REGISTRATIONS SHOW MORE FORD TRUCKS ON THE ROAD—ON MORE JOBS—FOR MORE GOOD REASONS

32 GOOD REASONS WHY TODAY'S NEW FORD TRUCKS ARE THE GREATEST IN FORD HISTORY

THE ENGINE

1. New aluminum alloy cam-ground pistons with 4 rings each—for improved oil control.
2. New steel-cored SILVALOY connecting rod bearings—provide 2½ to 3 times longer life.
3. Larger capacity oil pump—for improved lubrication and longer bearing life.
4. Rear main bearing oil seal—for added oil economy.
5. Oil filter, renewable cartridge type—to keep oil clean and reduce wear.
6. Removable plate at bottom of oil pan—for easy access to clean oil pump screen.
7. Balanced carburetion—for increased economy and efficiency.
8. Latest type self-washing oil bath air cleaner—keeps out destructive dirt, thus greatly prolonging engine life.
9. Thermostatically controlled exhaust by-pass valve regulates intake manifold temperature—for better fuel vaporization and economy.
10. Intake manifold—improved design for easy vacuum line connections.
11. New sealed-dry, V-outlet distributor—water-sealed, short-proof, air-cooled, trouble-free—streamline-molded of dielectric bakelite, with neoprene-coated high-tension leads protected by heavy ozone-resistant plastic jackets.
12. New aluminum timing gear—for longer life and silent operation.
13. Valve springs shot-blasted and rust-proofed—for longer life.
14. New stronger piston pins—for longer life.
15. New design interchangeable cylinder heads—for simpler, lower cost servicing.
16. More efficient exhaust valve cooling—for longer valve and cylinder block life.
17. High-efficiency fan—for better cooling.
18. Pressure-valve radiator cap—to prevent loss of coolant and improve engine operating efficiency.
19. New bronze thrust washer in water pumps—to prevent leaks and give longer life.
20. Oil-resistant synthetic rubber engine mounts with new design front cups—for longer life.
21. Oil pan divided at clutch housing—provides easier clutch servicing.

THE CHASSIS

22. Larger clutch in Tonner truck. 44.7% increase in friction area—for longer life.
23. Four-speed transmission now standard in Tonner—for more efficient operation and longer life.
24. Four-speed transmission, internal spring reverse lock—eliminates latch on shift lever.
25. New-design transmission main shaft splines—to provide positive gear mesh under load.
26. Thrust washers added at ends of four-speed transmission countershaft gear—for longer life.
27. Larger tires now standard on all chassis—to obtain maximum life from present-production tires.
28. Wheel rims uniform wide-base on each model—for better tire life and simplified servicing.
29. Two-speed axle vacuum shift—for easier control and elimination of separate shift lever.
30. Additional sill cross-member at rear of cab—for greater stability and longer cab life.
31. Cab door window glass mounted in metal frame—for greater strength to prevent glass breakage.
32. Larger, adjustable-arm rear-view mirror—for increased visibility and safety.

Flash — On every competitive test to date, LaPlant-Choate's new 8-yard cable-operated scraper has "run rings around" all other competitive scrapers tested. A limited number are already in the field, with everything set for economical mass production as soon as military conditions permit. You'll agree — it's a scraper well worth waiting for!

TRADE MARK

THOUSANDS OF SATISFIED OWNERS AGREE

It's LPC *for* LOWEST POSSIBLE COST

There are many good reasons why thousands of successful operators who have been using LaPlant-Choate rigs for years will keep right on buying them after the war. For one thing, these long-time users know from experience that LPC dozers and scrapers consistently move more yardage faster and at lower cost. They also know that LaPlant-Choate performance and dependability have been *job-proved around the world* under all types of conditions. And best of all, these veteran operators know that LaPlant-Choate will continue to lead the way in developing new improvements because LPC's entire organization is *strictly "tractor-equipment-minded"* . . . with more years of specialized "know-how" than any other company in the industry. So it all adds up to LPC—for lowest possible cost and better results—on your jobs, too. See your LPC-"Caterpillar" distributor today. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; San Leandro, California.

ARMY E NAVY

LAPLANT CHOATE

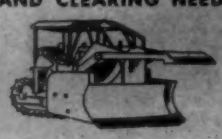
EARTHMOVING AND LAND CLEARING EQUIPMENT

THERE IS A JOB-PROVED LA PLANT-CHOATE RIG FOR EVERY EARTHMOVING AND LAND CLEARING NEED

ALL TYPES OF DOZERS — Straight or angling blade, hydraulic or cable operated, for every size of track-type tractor.

LARGE OR SMALL SCRAPERS — Hydraulic or cable operated, front or rear dump, for use with your wheel or track-type tractors.

CABLE OPERATED RIPPERS — For ripping up hard ground, shale or concrete to facilitate loading with LPC "Carrimer" Scrapers.



LAND CLEARING TOOLS — A complete line of Brush Cutters, Treedozers, Rootcutters and Brush Rakes—all are interchangeable.

The new Ward LaFrance civilian trucks now beginning to roll off our assembly lines offer you **plus values** in power, rugged construction, dependability and low hauling costs. You have never seen anything to match them.

THE TOUGHEST, MOST ECONOMICAL BIG TRUCKS MONEY CAN BUY...

Don't take our word . . . . . take a demonstration.

We know this because they are the civilian version of our military models which have been called on to do the toughest jobs any trucks ever were asked to perform, and proved themselves over millions of miles, in combat, all over the world.

Here's a truck that is new, better, **proved.** Forget the limitations you've become used to in the past. Think in terms of what you think a heavy truck **should** do, not what they always have done. Then give Ward LaFrance the chance to prove that it can deliver, right to your "ideal" specifications. If we have not yet appointed a dealer in your community, write our Sales Department outlining your requirements as fully as possible.

WARD LAFRANCE

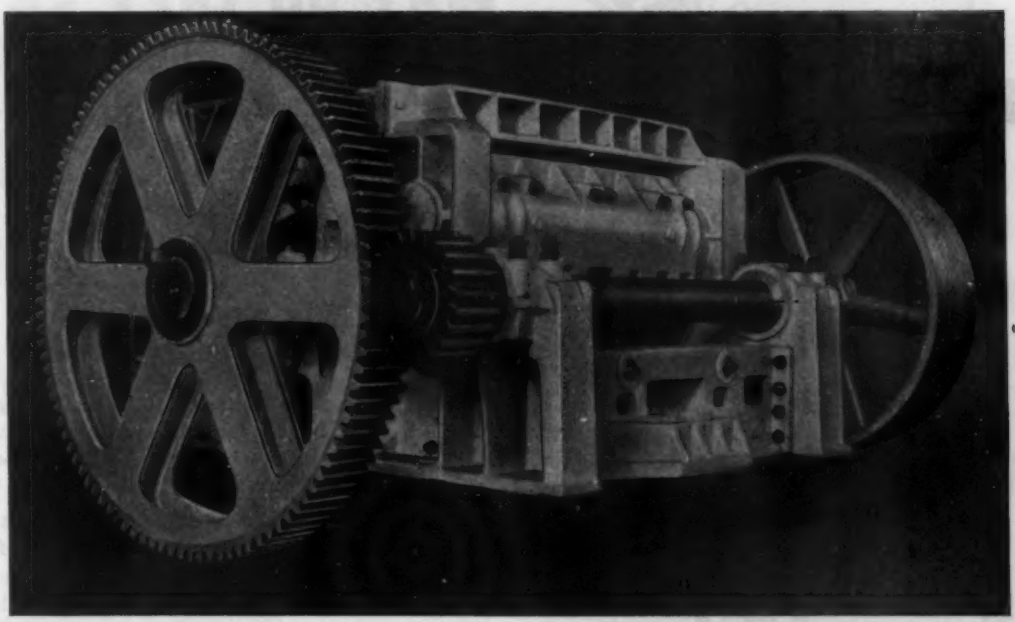
TRUCK DIVISION

GREAT AMERICAN INDUSTRIES, INC.

ELMIRA, NEW YORK

FRANCHISES AVAILABLE in several top-notch localities. Especially desirable for established dealers handling leading smaller, non-competitive makes . . . For complete details of the new profit-making Ward LaFrance Dealer Plan, write our Sales Department today.

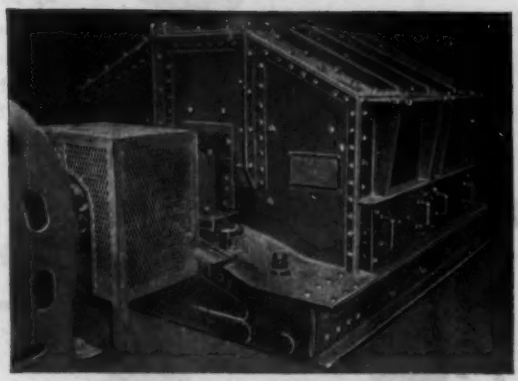
"PENNSYLVANIA"



"PENNSYLVANIA" *STEELBUILT*
PENN-LEHIGH
PRIMARY CRUSHER

Massively STEELBUILT, with wide reduction ratios, PENN-LEHIGH Primary Single Rolls do heavy duty, non-clog crushing of large Steam Shovel Cement-making Materials—Limestone—Gypsum Rock—and Industrial Minerals—(dry or wet)—year after year with unfailing dependability. Six (6) sizes. Capacity range 200 to 1000 tons per hour.

A PENN-LEHIGH Primary in your Post-War set-up, will assure continuous efficient operation, at low maintenance cost.



"PENNSYLVANIA" STEELBUILT REVERSIBLE HAMMERMILLS

For the secondary preparation of Cement-making Materials for grinding, "Pennsylvania" REVERSIBLES offer the notable advantages of Automatic Hammer Turning, and Resharpening of Hammers and Cage Bars—Sustained uniformity of Product Fineness—Automatic Tramp Iron Separation—and Sharply Cut Maintenance Cost.

Eight (8) sizes. Capacity range 100 to 700 tons per hour.

Complete Raw Side Crushing Equipment.
Forty years' experience—at your service.

17th Floor, Liberty Trust Building
Philadelphia 7, Pennsylvania

PENNSYLVANIA CRUSHER COMPANY

Associated with Fraser and Chalmers Engineering Works, London

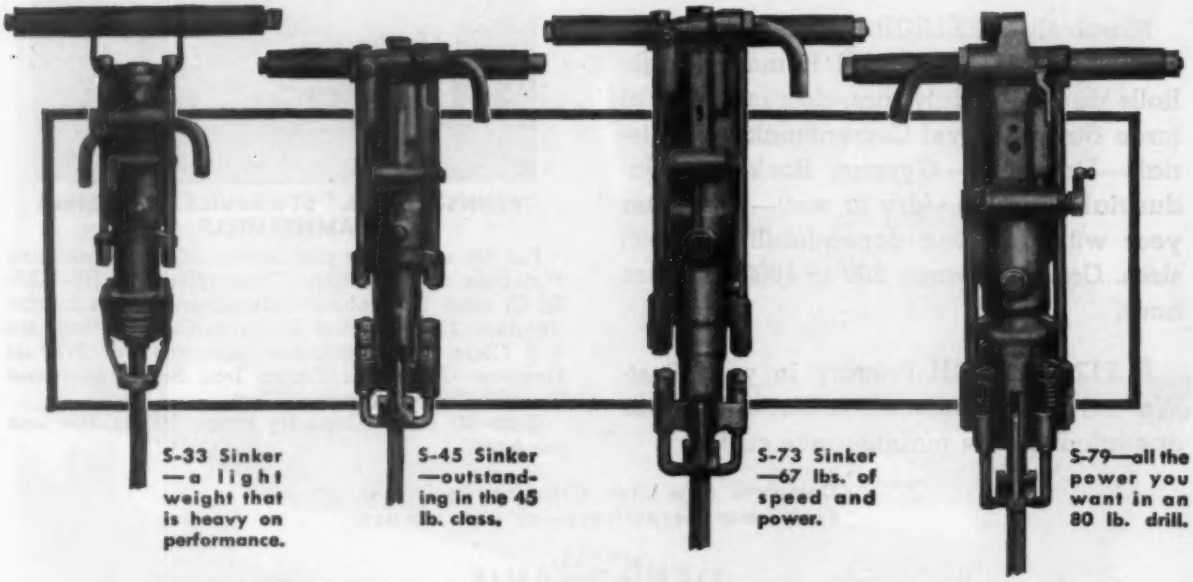
STEELBUILT CRUSHERS

WHY DO THEY SAY *This Drill Has No Equal?*

Why do so many users say that the Gardner-Denver S-55 Sinker has no equal in its weight class? Why has this sinker established such a remarkable reputation for performance?

Because, in the S-55, Gardner-Denver has provided exactly the *right* combination of qualities to assure maximum efficiency. The S-55 is fast AND easy riding . . . low in air consumption AND high in hole-cleaning ability. All of this adds up to *more footage*—with economy.

The S-55 is typical of the complete line of Gardner-Denver hand-held drills. Each is a winner in its weight class—each has the engineering "extras" that mean greater user satisfaction. For complete information about Gardner-Denver sinkers, write Gardner-Denver Company, Quincy, Illinois.



S-33 Sinker —a light weight that is heavy on performance.

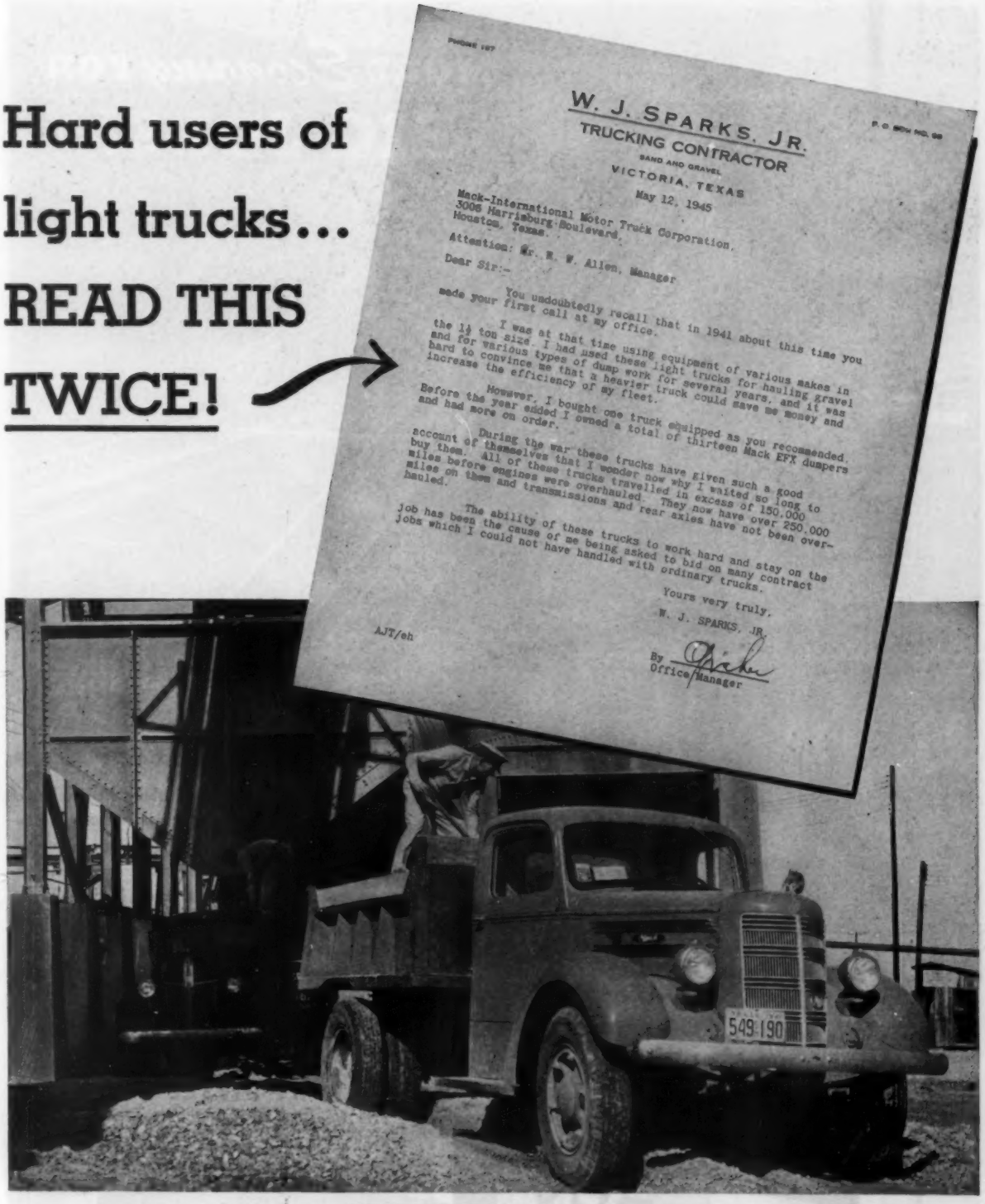
S-45 Sinker —outstanding in the 45 lb. class.

S-73 Sinker —67 lbs. of speed and power.

S-79—all the power you want in an 80 lb. drill.

GARDNER-DENVER *Since 1859*

Hard users of light trucks... READ THIS TWICE!



W. J. SPARKS, JR.
TRUCKING CONTRACTOR
SAND AND GRAVEL
VICTORIA, TEXAS

May 12, 1945

Mack-International Motor Truck Corporation,
3006 Harrisburg Boulevard,
Houston, Texas.

Attention: Mr. R. W. Allen, Manager

Dear Sir:-

You undoubtedly recall that in 1941 about this time you made your first call at my office.

I was at that time using equipment of various makes in the 1½ ton size. I had used these light trucks for hauling gravel and for various types of dump work for several years, and it was hard to convince me that a heavier truck could save me money and increase the efficiency of my fleet.

However, I bought one truck equipped as you recommended. Before the year ended I owned a total of thirteen Mack EFX dumpers and had more on order.

During the war these trucks have given such a good account of themselves that I wonder now why I waited so long to buy them. All of these trucks travelled in excess of 150,000 miles before engines were overhauled. They now have over 250,000 miles on them and transmissions and rear axles have not been overhauled.

The ability of these trucks to work hard and stay on the job has been the cause of me being asked to bid on many contract jobs which I could not have handled with ordinary trucks.

Yours very truly,

W. J. SPARKS, JR.

By _____
Office Manager

AJT/eh

★ BUY THAT EXTRA WAR BOND TODAY ★

Mack Trucks, Inc., Empire State Building, New York, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities including Toronto and Montreal, Canada.

Mack
TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

NEW Mack Trucks are available for essential civilian use. Ask for details.

MORE *Economy* FOR BIG JOBS!

Two Model ME-650 MURPHY DIESEL "Package Type" Generating Sets, 106 KW each, equipped with synchronizing equipment supplying power for Contractors Service Corporation's quarry in Pennsylvania.

TWO HUSKY MURPHY DIESELS POWERED THIS BIG JOB

On this large quarry operation, just outside of Harrisburg, Pennsylvania, The Contractors Service Corporation used two Murphy Diesel Generating Sets as the power plant, with outstanding success. Standard Murphy Diesel units may be hooked up in any multiple to provide ample power for peak loads, and maximum economy for partial loads when the full combined engine power is not required. ☆ Engineered for heavy-duty service, Murphy Diesels are living up to their reputation of more power, more profit for users. Rugged, compact, relatively light in weight, readily portable, simple and economical to operate and maintain, Murphy Diesels have won well deserved popularity throughout the construction industry where dependable power is a "must". WRITE FOR BULLETIN.

★ *Buy U. S. War Bonds* ★

MURPHY DIESEL COMPANY
5315 West Burnham Street • Milwaukee 14, Wisconsin

More Power
MURPHY DIESEL
Reg U.S. Pat Off.
More Profit

Engines: FROM 90 to 215 HP
Generators: FROM 60 to 115 KW

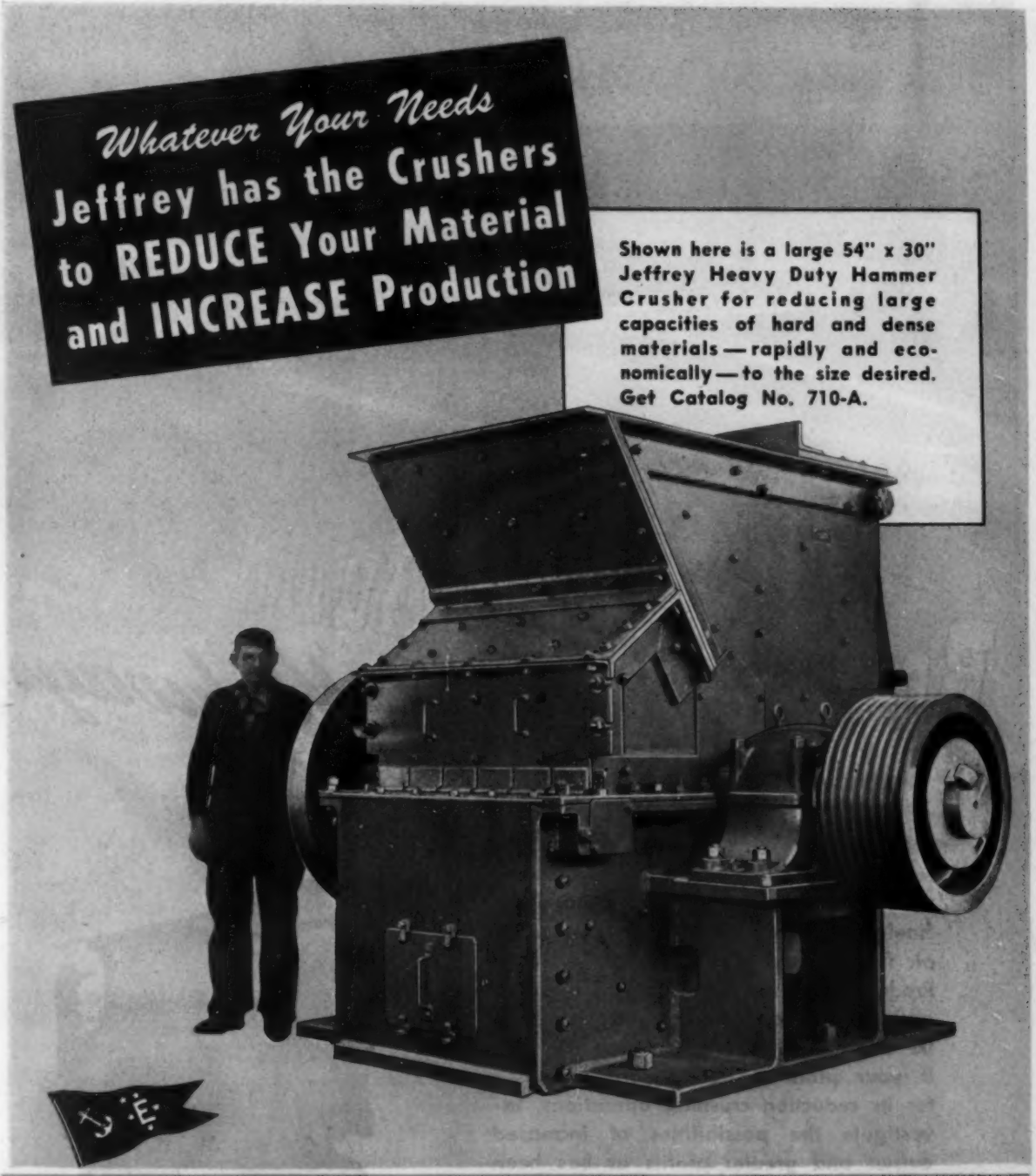
"FIELD-PROVEN *Power*"

104

Whatever Your Needs

Jeffrey has the Crushers to REDUCE Your Material and INCREASE Production

Shown here is a large 54" x 30" Jeffrey Heavy Duty Hammer Crusher for reducing large capacities of hard and dense materials — rapidly and economically — to the size desired. Get Catalog No. 710-A.



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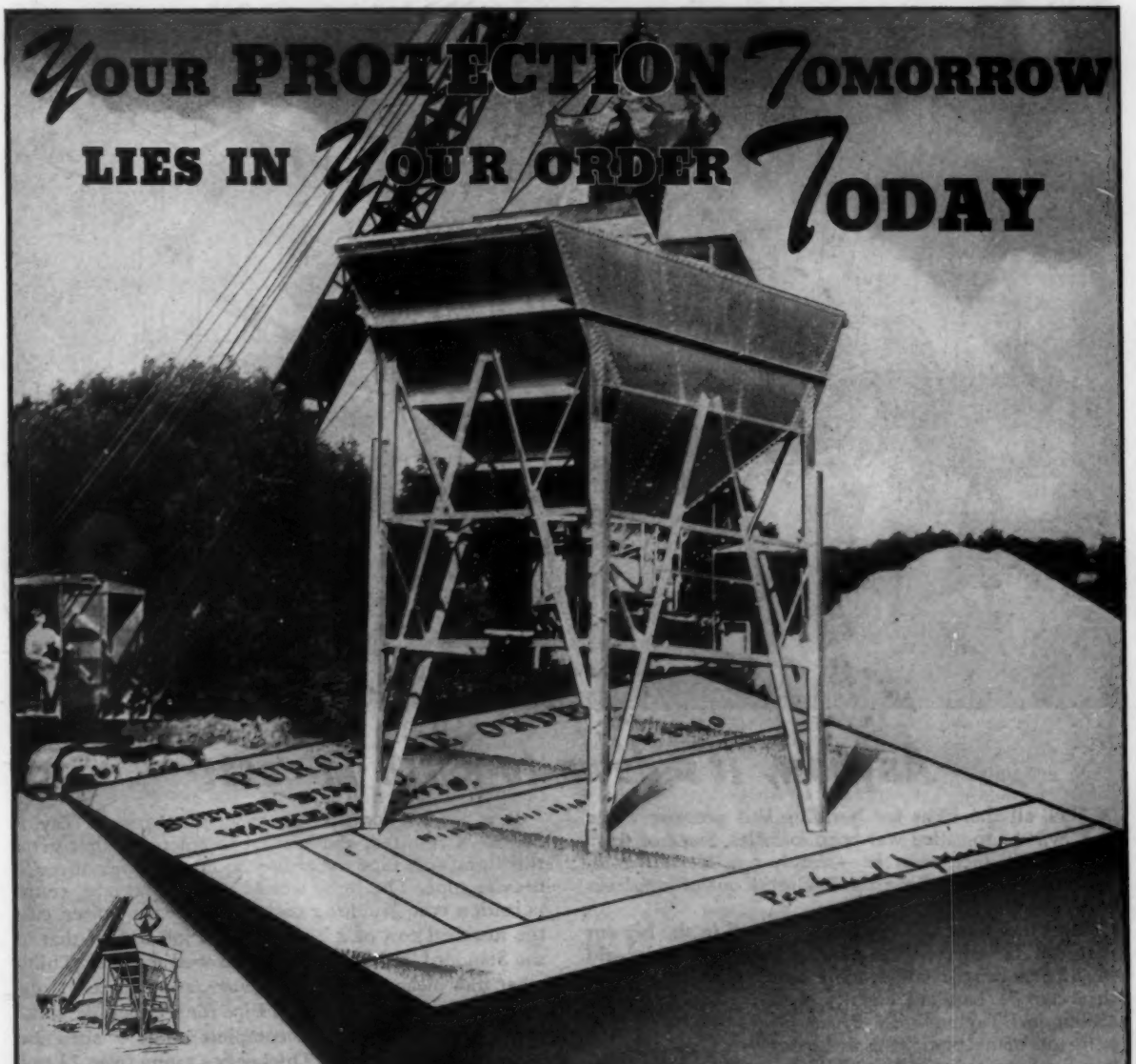
Be Prepared to Build *Tomorrow's Highways*

When the many construction projects deferred by war can again be undertaken, there will be an increased demand for finely crushed materials for new highways, air fields, dams and other public works. Producing these materials in quantity and at low cost is a job that can best be done with a Symons Cone Crusher. If your plant is not Symons equipped for its reduction crushing operations, investigate the possibilities of increased output and greater profits as has been proven in many rock and gravel plants where this crusher is now installed.

NORDBERG MFG. CO.
MILWAUKEE 7, WISCONSIN
NEW YORK · LOS ANGELES · LONDON · TORONTO · JOHANNESBURG

SYMONS CONE CRUSHERS

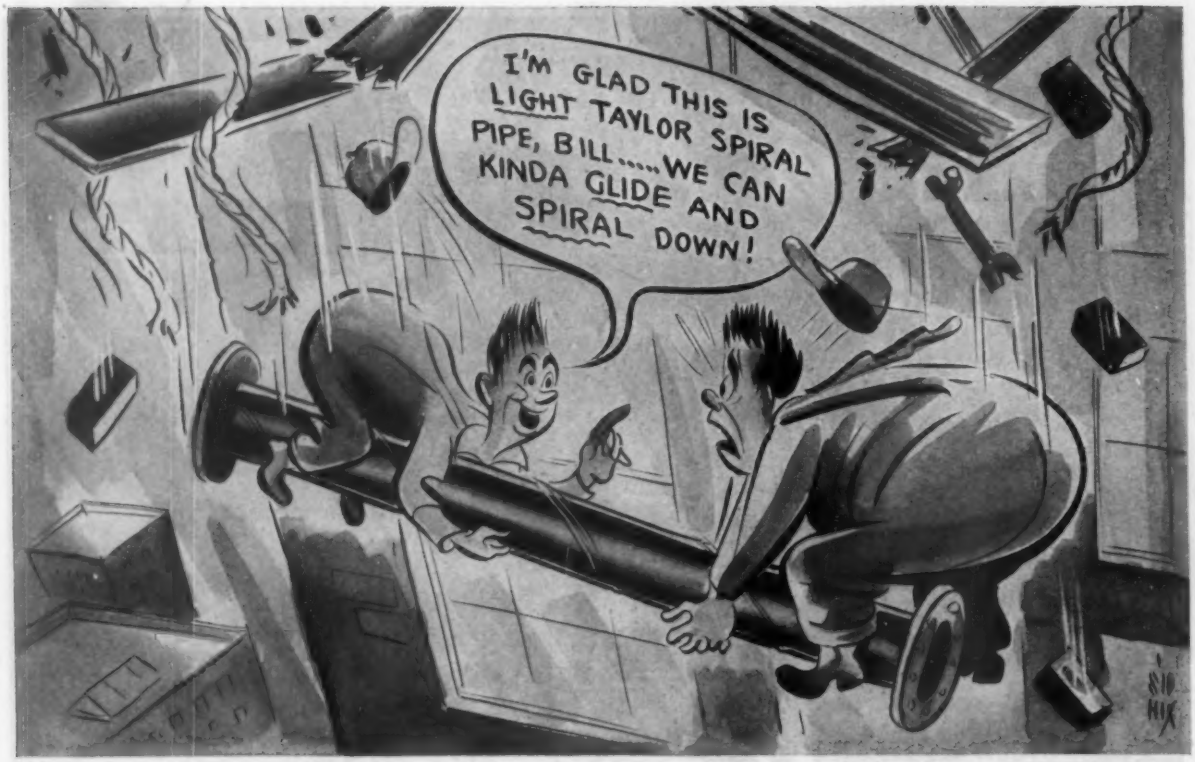
YOUR PROTECTION TOMORROW LIES IN YOUR ORDER TODAY



Stop and analyze now, — today — your future equipment requirements. Analyze in the light of two imperative factors. First, — highway reconstruction alone, to say nothing of the vast new highway programs, involve an equipment demand that will require as much effort on the part of manufacturers as ever did the demands of war. Second, — time schedules, competition and the magnitude of the task will require equipment engineered to the utmost in capacities and production.

For these reasons, sound, far sighted policy dictates that, — to be assured that the most modern equipment (the finest in high production Engineered Design will be on your jobs when you want them) — your order should be placed now for future delivery — and, of course, placed with Butler.

BUTLER
BIN COMPANY
WAUKESHA, WISCONSIN



Anyhow, it's down-to-earth in cost!

NOT all the ideas for building this postwar world will be so-called war-born miracles. Some of them will be—in fact, *must* be—simply sensible, down-to-earth ways of knocking the daylights out of construction costs.

A good example of this will be found in the big cut that can be effected by getting away from the old practice of using heavier, more costly pipe for services that can be handled equally well by lighter, more economical Taylor Spiral Pipe.

In too many plants for too many years the practice has been to use Standard Thickness pipe for all run-of-plant piping. And yet a large percentage of this run-of-plant piping is for services like those listed below —applications that can be handled adequately and with strength and service life to spare by light-but-strong Taylor Spiral Pipe.

It is the higher strength-to-weight ratio of Taylor Spiral—a result of the spiral construction—that gives this light wall pipe the ability to do the work of much heavier pipe. The light weight cuts initial cost, transportation cost, handling cost, erection cost—often cuts the installed cost of a Taylor Spiral job to half that of the Standard Thickness Pipe it so well replaces. Think what that means in terms of *your* piping costs.

Switching to Taylor Spiral Pipe for services like those listed is made easy by the complete range of sizes and wide variety of fittings. Thicknesses range from 12 to 8 gauge; sizes from 6" to 42"; joint lengths up to 40 ft. All types of end joints and couplings, all kinds of fittings and specials or fabricated assemblies are produced by Taylor Forge & Pipe Works, assuring complete service and undivided responsibility.

TAYLOR FORGE & PIPE WORKS

General Offices & Works: Chicago, P. O. Box 485 ★ New York Office: 50 Church St. ★ Philadelphia Office: Broad Street Station Bldg.

CHANGE TO TAYLOR SPIRAL PIPE FOR:

- High and Low Pressure Water Lines
- Low Pressure Steam and Air Lines
- Steam and Diesel Exhaust Lines
- Vacuum and Suction Lines
- Blower Piping
- Sand and Gravel Lines
- Industrial Gas Lines
- Oil and Gas Gathering Lines
- Swing Pipe
- Spray Pond Piping
- Hydraulic Mining
- Dredge Line

Is your ROPE-RIGGED EQUIPMENT *ready.. for the big job ahead?*

NO TIME LIKE NOW to check over your equipment's readiness . . . for the big competitive job ahead. And in checking your wire rope, include these points:

Are sheaves and drums regularly checked for excessive wear that would injure the rope operating over them? Does the rope get proper handling, lubrication, inspection, maintenance? Is it Roebling "Blue Center" Steel Wire Rope?

If the answers are "yes", bank on dependable, long-lasting, economical rope service . . . for today's toughest, tomorrow's biggest jobs. For "Blue Center", preformed or non-preformed, combines smooth-running flexibility with high abrasion-and-fatigue resistance . . . and extra strength for extra duty!

It's the result of fine Roebling steel, exceptional equipment, a century-old tradition of sound workmanship. And whether *your* rope problem is one of selection, operation or maintenance, Roebling engineering service can help you solve it . . . to your advantage.

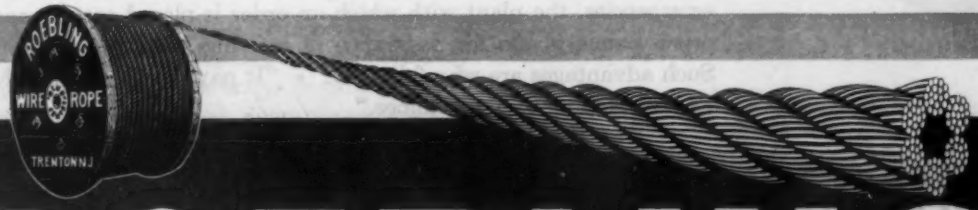
When government needs taper off, Roebling wire rope will again be available to non-priority users, in order of request. Why not place *your* order now?

JOHN A. ROEBLING'S SONS COMPANY

TRENTON 2, NEW JERSEY

Branches and Warehouses in Principal Cities

WIRE ROPE AND STRAND • FITTINGS • SLINGS • AIRCORD, SWAGED TERMINALS AND ASSEMBLIES • COLD ROLLED STRIP • ROUND AND SHAPED WIRE • WIRE CLOTH AND NETTING • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS SUSPENSION BRIDGES AND CABLES • ELECTRICAL WIRES AND CABLES • AERIAL WIRE ROPE SYSTEMS



ROEBLING

PACEMAKER IN WIRE PRODUCTS

"Just look at the locations of those six Bemis Multiwall plants!"

"Yes, that's another reason IT PAYS TO BE A BEMIS MULTIWALL PAPER SHIPPING SACK CUSTOMER!"

The strategic locations of the six Bemis Multiwall plants mean quick service to all sections of the country. • And that's not all . . . working as a team, these plants support each other in filling the needs of Bemis customers. In emergencies, the plant with which an order is placed can depend on five other Bemis plants for assistance in meeting scheduled shipping dates. Such advantages are why folks say: • "It pays to be a Bemis Multiwall Paper Shipping Sack Customer."

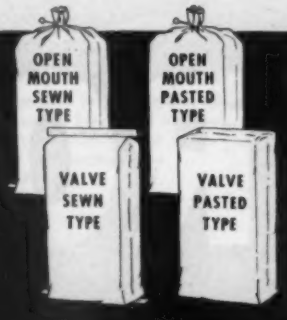
Bemis Multiwall Paper Shipping Sacks

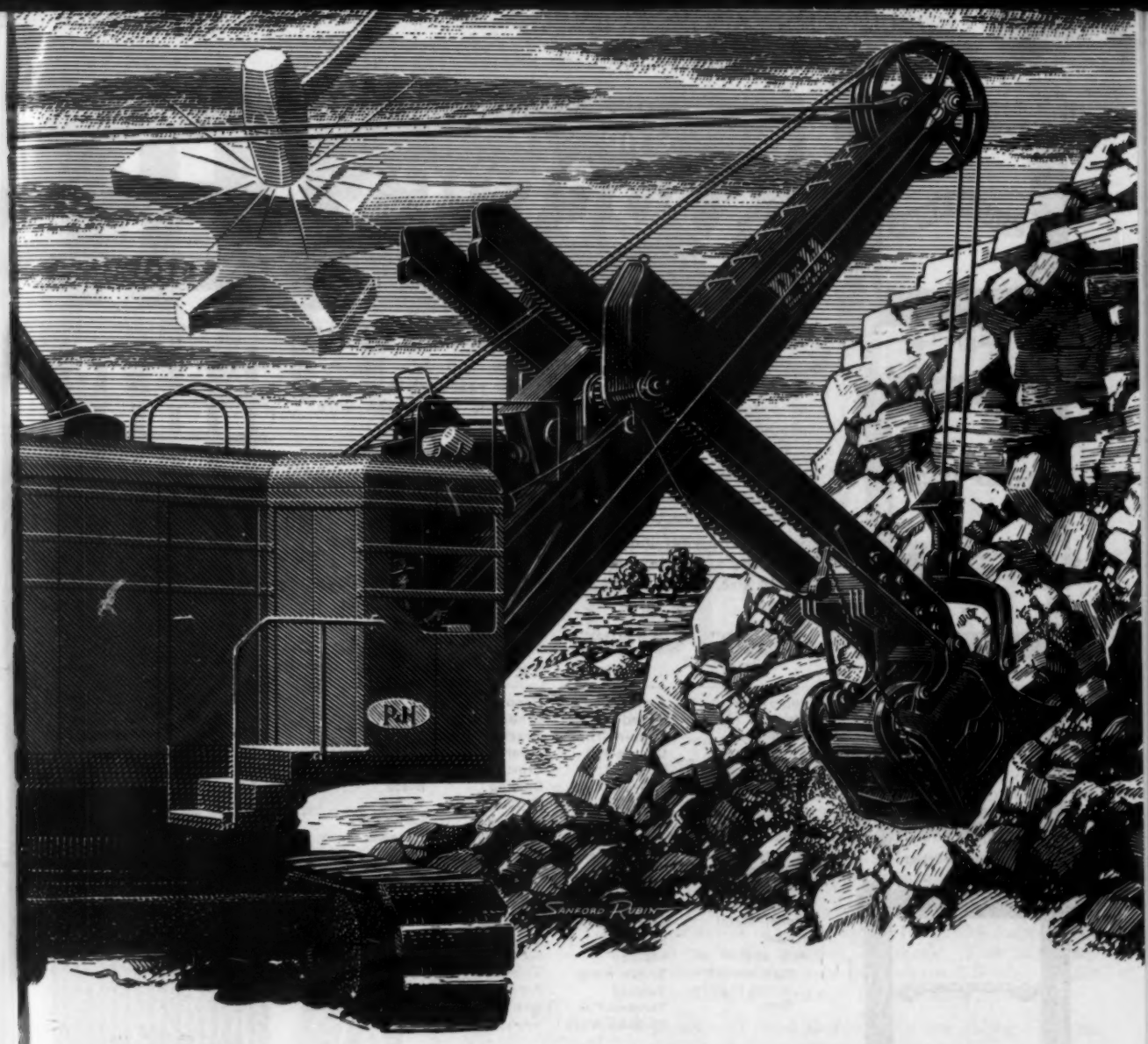
6 PLANTS

Peoria, Ill. · East Pepperell, Mass. · Mobile, Ala. · San Francisco, Calif. · Wilmington, Calif. · St. Helens, Ore.

BEMIS BRO. BAG CO.

OFFICES: Baltimore · Boston · Brooklyn · Buffalo · Charlotte · Chicago · Denver · Detroit · East Pepperell · Houston · Indianapolis · Kansas City · Los Angeles · Louisville · Memphis · Minneapolis · Mobile · New Orleans · New York City · Norfolk · Oklahoma City · Omaha · Orlando · Peoria · St. Helens, Ore. · St. Louis · Salina · Salt Lake City · San Francisco · Seattle · Wichita · Wilmington, Calif.





Pre-Treated For Shock

Maximum shock resistance is assured for this shovel by two simple facts. One is that rolled alloy steel excels in toughness under recurring impact. Fact two is that all-welded, deep box-section construction is the strongest design principle known.

The new P&H Electric Shovel combines these advantages to the finest degree in both upper and lower frames. Shocks and stresses encountered with every working motion are dissipated before they can reach vital mechanical parts. Design throughout is greatly simplified.

The boom, car body, and revolving frame of a P&H, for example, are welded into completely integral units with the right metal in the right place. All the weight in all parts is live working weight.

The greater rigidity of welded alloy steel prevents weaving, keeps the machinery in line.

Here's a typical P&H contribution in the interest of lower digging costs in open pits. The new P&H Electric Shovels embody many other equally important developments you should know about. Write for Bulletin X-83.

P&H ELECTRIC SHOVELS
4465 West National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

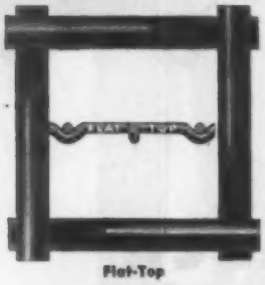
EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

THE GREATEST FORWARD STEP EVER MADE IN ELECTRIC SHOVEL DEVELOPMENT

Double-Crimp

Arch-Crimp

Intermediate-Crimp



Flat-Top

"The Perfect" Wire Cloths and Screens

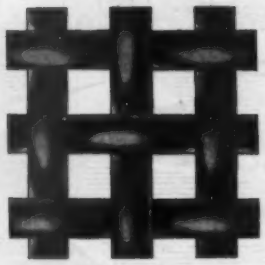
We have been specialists for many years in the making of precision wire cloths, wire screens and woven wire products.

We apply our same precision principles in fabricating wire cloths into finished industrial units, for production or processing equipments or for permanent parts of countless industrial products.

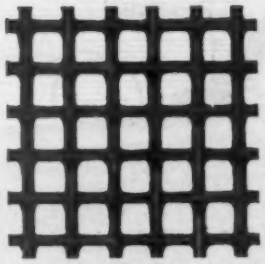
We invite your inquiries for wire cloths of all commercial metals or alloys or weaves, in continuous lengths or cut to size, or processed to meet your individual requirements.

"Perfect" alloys and metals	"Perfect" Wire Cloth weaves	"Perfect" Wire Cloth processing	"Perfect" Wire Cloth products
Super-Loy	Arch-Crimp	Bending	Baskets
Steel	Coiled	Binding	Circles
Galvanized	Double-Crimp	Brazing	Cones
Tinned	Double-Fill	Calendering	Crates
Stainless Steel	Dutch	Clinching	Cylinders
Nickel-Chromium Alloys	Filter	Cutting	Discs
Aluminum	Flat-Top	Dipping	Forms
Brass	Herringbone-Twill	Dishing	Leaves
Bronze	Intermediate-Crimp	Flanging	Lengths
Commercial Phosphor	Rek-Tang	Flattening	Panels
Copper	Selvage-Edge	Forming	Pieces
Monel Metal	Straight-Warp	Framing	Racks
Nickel	Stranded	Galvanizing	Ribbons
Any special alloys available in rod or wire form	Sta-Tru	Painting	Rolls
	Triple-Warp	Shearing	Sections
	Twilled	Slitting	Segments
	Twisted-Fill	Trimming	Spacers
	Twisted-Warp	Arc-Welding	Strips
		Gas-Welding	Template shapes
		Spot-Welding	Trays

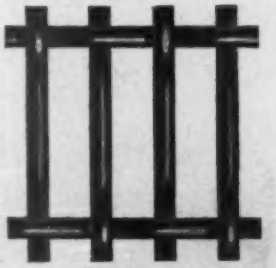
We will follow your specifications and blue-prints exactly as your production engineers have prepared them—or we will submit suggestions for your approval.



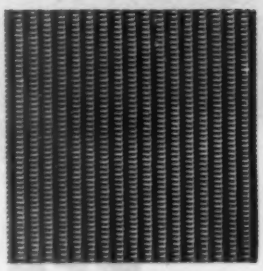
Double-Crimp



Galvanized



Rek-Tang

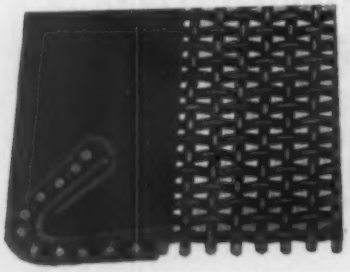


Dutch Weave

The LUDLOW-SAYLOR WIRE COMPANY

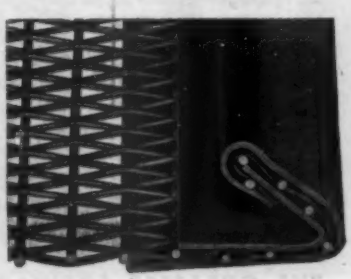
Newstead Avenue & Wabash Railroad

ST. LOUIS 10, MO.

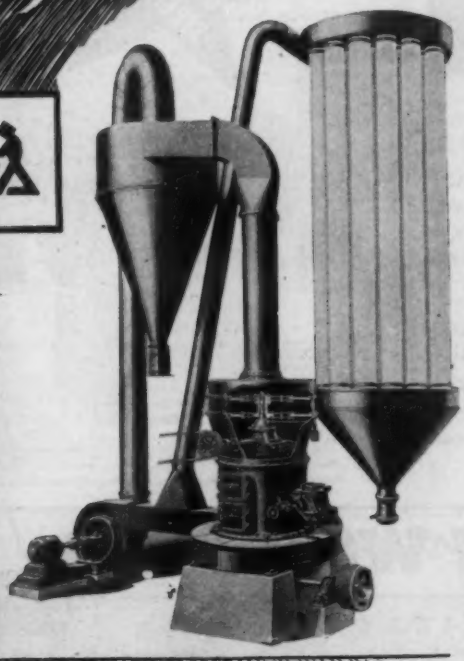


LUDLOW-SAYLOR PRECISION FABRICATING makes vibrating-screen decks and jackets that are easily handled—quickly installed—need fewer adjustments and renewals.

Illustrations suggest only a few of the many available types of wire cloth and woven wire screens which may be custom-finished with attachments to fit your particular processing installations.



RAYMOND Whizzer type ROLLER MILL



IT is largely the *whizzer separator* that is making the Raymond Roller Mill so increasingly popular for fine grinding in the rock materials field.

This feature gives closer product-control, higher mill capacities and greater flexibility in fineness regulation. The revolving whizzer blades are operated independent of the mill through an individual motor with variable speed transmission.

Simply changing the speed of the whizzer provides a wide range of classification from 60% minus 100-mesh to 99.9% passing 325-mesh. This is an advantage in custom grinding, where different grades of products are ground in the same mill.

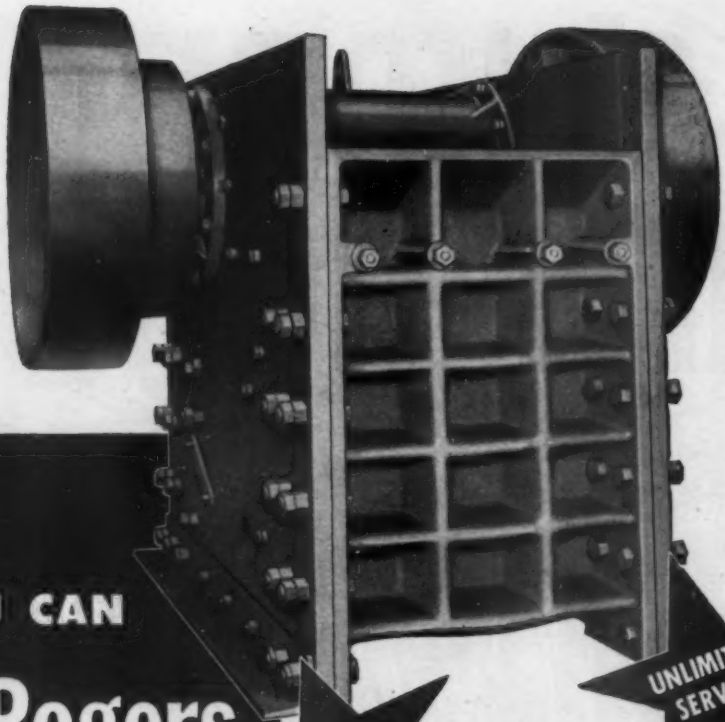
Whizzer-equipped Roller Mills are giving economical and uniform production on such materials as limestone, burnt lime, barytes, bentonite, kaolin, magnesium oxide, phosphate rock, bauxite and talc.

Whizzer Separators may be built integral with new Raymond Roller Mills, Imp Mills and Automatic Pulverizers . . . or furnished as a motor driven unit for attachment to your present Raymond Mill. Ask for details.

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1307 North Branch St. Chicago 22, Illinois

Sales Offices in Principal Cities
Canada: Combustion Engineering Corp., Ltd., Montreal

Fineness instantly adjustable while running



WHY YOU CAN Rely on Rogers JAW CRUSHERS

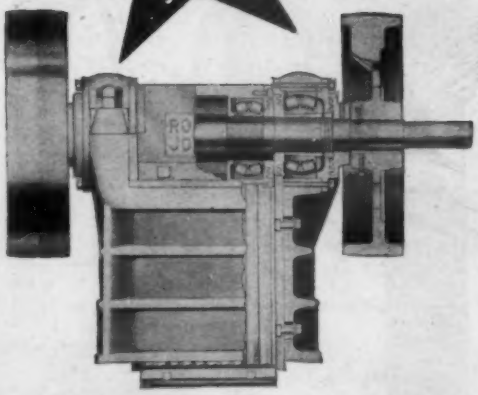
MORE CAPACITY

GREATER STRENGTH

UNLIMITED SERVICE

Oversize bearing and shaft diameters—from two to three sizes larger than normally used—are a big reason why *there has never been a bearing or shaft failure in a Rogers Jaw Crusher* and why Rogers Crushers have a greater rock reduction capacity. The Rogers line of Jaw Crushers is complete, in 16 sizes from a small reduction to a large primary crusher with large jaw opening.

Rogers Rock Reduction machinery for crushing, sizing, conveying and storing has a reputation for reliability, strength and precision performance that has made Rogers a name for economical and efficient operation all over the world. For a single unit or a complete plant, you can always "Rely on Rogers".



The heart of the Rogers Jaw Crusher—oversize shaft and anti-friction bearings. (Also available with bronze bearings.) Write for complete descriptive bulletin today.

ROGERS IRON WORKS CO.

JOPLIN, MISSOURI

Quarry Plants • Gravel Plants • Jaw Crushers • Roll Crushers • Belt Conveyors • Bucket Elevators • Screens • Feeders • Steel Bins

THORNTON gives positive DRIVE TO BOTH REAR AXLES *Without Axle Fight*

This is the Thornton Drive Bogie, consisting of 2 driving axles; 2-speed gear case assembly with *Automatic-Locking* Differential in ring gear; "walking beam" type springs; wheels; 8 new tires.

Trucks operating off the highway must have 2 rear driving axles with *positive drive* to provide maximum traction.

However, *positive drive* to the rear driving axles is not all that is required to give you the greatest number of truck-work days per year. The Drive also must have *Differential Action* to avoid "axle fight" which causes tires to scuff, wastes fuel, and destroys ring gears, pinions, joints, etc.

The THORNTON *4-Rear-Wheel* DRIVE has proved, through years of grueling work and severe war demands, that it does deliver "go ahead" traction under the most obstinate conditions (and provides 100% more payload; up to 50% gradability; and, certain definite operation economies).

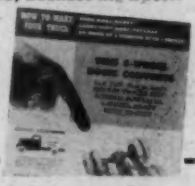
Whether you haul logs from the woods; sand and gravel from the pits; coal from the mines; spread lime over soft fields; or haul heavy oil field equipment; you need the maximum traction provided by the Thornton Drive. Thornton equipped trucks have the power and traction to operate in all kinds of weather, over all kinds of roads. They will work many more days per year than a conventional truck having only one driving axle.

The heart of the THORNTON DRIVE is the THORNTON *automatic-locking* DIFFERENTIAL—an exclusive feature which provides both POSITIVE DRIVE and DIFFERENTIAL ACTION.

Thornton's solution to the problem of obtaining "off the highway traction" without having "axle fight" represents one of the outstanding contributions to the automotive industry during the past 30 years. This *automatic-locking* DIFFERENTIAL, as an integral part of the Thornton Drive, enables the truck to drive as long as there is traction on the wheels of either axle. Its automatic Differential action permits an over or under running of the ring gear of either axle as required by the contour of the road bed, whether moving forward or in reverse.

When the THORNTON DIFFERENTIAL is also used in place of the conventional differential in each driving axle, the ultimate in traction is provided, because *all wheels must rotate* when power is applied.

FREE: *Mail coupon for descriptive folders and full details about the Thornton Four-Rear-Wheel Drive.*



* NO WPB RELEASE NECESSARY

IDEAL FOR LIME SPREADING

THORNTON 4-REAR-WHEEL DRIVE
KEEPS TRUCKS WORKING IN BAD CONDITIONS

Thornton Tandem Co.

8701 Grinnell Avenue, Dept. 53, Detroit 13, Michigan, U.S.A.

Please send me catalog of facts on changing my 1½-2 ton truck into a heavy duty truck.

Name _____

Address _____

City _____ State _____

Make of Truck _____ Year _____

Used for _____

Osgood PROVED IN SERVICE

9-Year-Old Osgood Shovel Brings Top Price in Surplus Equipment Sale

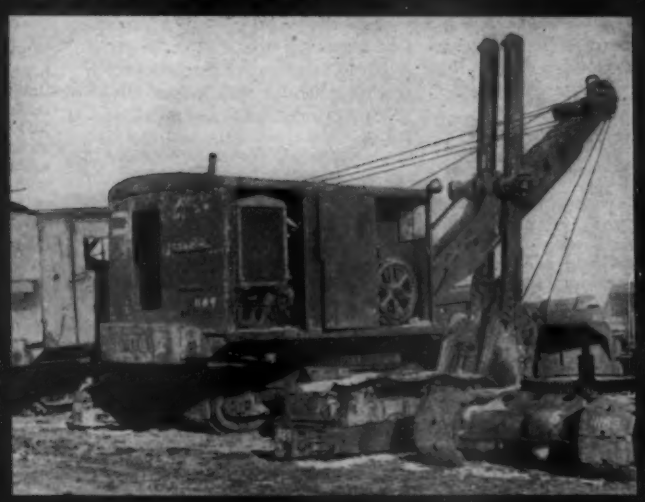
Even after it had gone through nine years of grueling service, this Osgood shovel looked good to the experienced construction machinery dealers who were bidding on it. Every one of the bidders was banking on the stamina built into every Osgood machine . . . they knew that there still were years of service left in this veteran.

That's what engineered design and precision manufacture means—long-lived, dependable, trouble-free service. It's an important fact to keep in mind when you're selecting your new equipment for postwar projects. We'll be glad to send complete information on the complete line of Osgood construction, excavating and materials handling equipment . . . to tell you how and why Osgoods will stay on the job, day after day, turning in better performance records at lower cost.

THE RECORD

Manufactured in 1936, this 1½ yard Osgood shovel had already turned in nine years of faithful service when it was offered at a recent surplus equipment sale. The bidders, experienced construction and excavating machinery dealers, knew the machine had been in service on the Alcan highway project for nearly two years; working under the most adverse conditions, with only sketchy provisions for maintenance. This Osgood, nine years old and offered "as is," brought the highest price of any of the 1189 pieces of equipment in the sale!

THE MACHINE



THE GENERAL EXCAVATOR COMPANY
GENERAL CRANES, DRAGLINES AND SHOVELS
DIESEL, GAS, ELECTRIC

Associated with The General Excavator Company

OSGOOD

THE OSGOOD COMPANY • MARION, OHIO

ARMY E NAVY

OSGOOD
SHOVELS, DRAGLINES
CRANES

Here Today (Producing 1,026-tons aglime, daily average)

Day after day this versatile Universal portable crushing plant turns out 100 to 114-tons of aglime for L. T. Renner of Rock Falls, Illinois. With a simple 15-minute adjustment both aglime and road rock can be produced without changing the screens. Plant consists of a 546-P primary crushing unit with 20" x 36" jaw crusher and 36" x 8' apron feeder, secondary pulverizer, 4' x 12' double deck screen, 3 compartment bin (lime, rock and surge compartments), conveyors.

gone tomorrow! (Moved on a moment's notice).

With all the ruggedness and stability of a lifelong permanent installation, this Universal engineered plant can be quickly moved to a new location. Primary and secondary units and bin with screens are built on chassis, on which pneumatic-tired wheels are readily installed. Renner gets flexibility of product, lowest cost per yard of finished material and mobility of entire plant. Send for further facts.

Universal Engineering Corporation
617 C Ave. West, Cedar Rapids, Iowa

Photos courtesy Eighmy Equipment Co., Rochelle, Ill.—another "live wire" Universal dealer!

ARMY NAVY

UNIVERSAL

ROCK AND GRAVEL CRUSHERS, CRUSHING ROLLS, HAMMER MILLS, COMPLETE CRUSHING AND SCREENING PLANTS, WASHING PLANTS, ASPHALT PLANTS, SPREADEROLLERS.

BECAUSE any belt conveyor system consists primarily of two main units—a BELT to carry the load, and a MECHANISM to move the belt—the engineering of these two vital units requires the closest kind of cooperation between equipment designer and belt manufacturer.

That is the kind of cooperation that produces the best results for *you*. Therefore, it is only natural that HEWITT, a name backed by 85 years in producing quality rubber products . . . and ROBINS, a name pre-eminent in the field of materials handling machinery for 49 years . . . should combine their 134 years of industrial experience. By combining their efforts . . . pooling their research . . . merging their resources and distribution facilities, they can offer you the *only complete job-engineered materials handling service in America.*

from HEWITT — quality rubber products for industry for 85 years. Precision-built, JOB-ENGINEERED conveyor *belts* for half a century.

from ROBINS — the finest JOB-ENGINEERED materials handling *machinery* for 49 years.

* * *

now, from HEWITT and ROBINS the only complete JOB-ENGINEERED *materials handling service in America.*

HEWITT RUBBER *of Buffalo*

HEWITT RUBBER CORPORATION, Buffalo, N. Y.

ROBINS CONVEYORS INCORPORATED, Passaic, N. J.

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ROCK PRODUCTS

Gauge Plant Capacity to Market

A SANE APPROACH in gearing plant capacity to actual anticipated market requirements for concrete masonry units is urged by W. D. M. Allan, Director of Promotion for the Portland Cement Association, in an exceedingly timely article in this issue of ROCK PRODUCTS. Mr. Allan directs his thinking specifically to the concrete masonry industry in his article but his philosophy certainly applies, at least in part, to the ready mixed concrete industry and to a lesser degree, perhaps, to other building material producers.

The pitfalls stemming from over-zealousness or shortsightedness which could well lead to tremendous over-capacity in plant are clearly presented; therefore with all the intensive planning for production going forward the article is recommended reading.

While realizing the article represents a selfish point of view—in that it is the cement manufacturers' point of view—after all it is in the interest of every concrete products manufacturer to see that all concrete products give the user satisfaction.

Too many plants—or too much productive capacity—not merely leads to bankruptcy of individuals or corporations but to depreciation of the product, in order to undersell competitors. No product is easier to deteriorate than concrete products for the ordinary uses, without the purchaser being aware. A concrete masonry wall or home stands for all to see, to admire or criticize, for the good of the manufacturer and industry or for their condemnation. The same applies to ready mixed concrete.

The successful manufacturer depends for most of his volume of business upon sales within a radius of ten or fifteen miles of his plant. Having an expensive plant that must be written off, and an insufficient volume of business to warrant it, the temptation is almost irresistible to cut prices and extend operations into the other fellow's territory in order to get volume.

All of which reminds us of a facetious remark made the other day by the quick-witted proprietor of a thriving restaurant in the Chicago area. When one of his regular customers asked how come he could serve such excellent meals so reasonably, he retorted, "I lose a nickel on each meal but, remember, it's mass production that counts."

If his prices continued so low that he actually was losing a nickel per meal, it is certain that the quality of those meals would deteriorate. That's what has happened many times over in the concrete masonry industry within *certain* highly competitive areas. Anyone knows that the eight cent block (normally thirteen to sixteen cents) hasn't enough cement in it and that manufacturing costs have been shaved in every way to hold down losses while each participant tries to run the other out of business.

Since, as the article says, substantial progress has been made at the expense of much time and effort to give a quality rating to concrete products, any development that would stop or reverse this progress is bad for all concerned.

The trouble is that accepted standards of manufacture, which govern quality and performance of concrete masonry units, often were thrown into discard in the interests of speed during the heavy war construction period. Manufacturers in certain areas—which we will not mention—who a few years ago were bragging how they sold properly-cured concrete products on a quality basis, all of a sudden were boasting that business was so good that they were unable to build up stockpiles. Conditions demanded speed, to be sure, but let's hope that such wartime practices are not habit-forming.

The industry must resume where it left off in building confidence for its product. Concrete masonry is a proved, high-grade building material that will grow in acceptance to new heights, if the industry takes steps to guard against letting the bars down on quality.

Large Versus Small Manufacturers

Too much excess capacity is to be avoided. Not that we wish to deter enterprisers from entering this industry, but let them enter with their eyes open, and with attention to economy and efficiency of manufacture for quality products rather than for large unnecessary capacity, unless they are entering a territory where local manufacturers are not making the most of their opportunities.

The great advantage of this industry is that the alert small producer can make as *good* a product as his biggest competitor and, if he is on his toes, probably at no greater manufacturing cost. After all, most of our big successful manufacturers became big because they had the right ideas when they were small. And, the little operator who knows how to conduct his business properly, even if in a limited market area, is the fellow who will diversify and later become a large user of cement, aggregates and machinery.

Development of a market coincident with the development of capacity is of course now considered the most essential thing in any business, particularly building materials, demand for which can usually be determined with a very fair degree of accuracy six months to a year in advance.

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★ ★ ★ Washington NEWS

PRICE ADMINISTRATOR Chester Bowles of O.P.A. tossed a bomb into the home building situation with his rather strong statement that rigorous controls would have to be continued on all building materials, and he even went so far as to recommend some form of legislation controlling prices at which new and old properties may be sold. Producers contend that inherent competitive forces within the building material industries would hold prices within reasonable limits, and real estate and construction interests claim that controls on the prices of housing, new and old, would tend to stifle construction. John W. Snyder, Director of War Mobilization and Reconversion, pointed out that a healthy expansion in the building industry is essential to a postwar program of abundance. A housing census taken in 1940 indicated that almost 40 percent of the homes in the country should be either substantially rebuilt or torn down and replaced. Mr. Snyder is quoted as saying, "If properly handled, we can look forward to the building of between 1,000,000 and 1,500,000 homes each year for at least 10 years after the war."

Cement and Ready Mix Prices

O.P.A. announced an increase of 10c per bbl. in manufacturers' ceiling prices for cement produced in Ohio, West Virginia, Michigan and some parts of Pennsylvania, Virginia and Kentucky, effective September 5. The order applies to all types of portland cement, except white cement, and includes masonry and other special kinds of cement. Ready mixed concrete producers and building supply dealers only in this territory may pass on the increase in price per barrel to customers.

Another Relaxation of L-41

W.P.B. announced on September 6 a further relaxation of the general construction order L-41 and revocation of the order limiting highway construction (L-41-e). The recent amendment to L-41 removes from control alterations and repairs to existing buildings, construction of transportation facilities and construction of farm buildings other than farm houses.

Transportation facilities now permitted without authorization include airports or airway facilities; bridges; railroad tracks, railroad stations and repair shops; and bus and truck terminals; and oil and gas pipelines, including terminal, loading and unloading facilities. Alterations and repair work not involving exterior additions are now permitted without authorization regardless of the type of work or cost.

Revocation of Order L-41-e, covering public highways and street construction, also revokes all specific action previously taken by W.P.B., directing individual builders to stop construction. The exception to this revocation is suspension or consent orders issued on the basis of violations of W.P.B. orders or regulations.

Although not part of L-41, the revocation of lumber order L-335, effective September 30, has a direct bearing on construction prospects. This action frees lumber distribution from all controls under this order.

Lift Price Ceiling on Dimension Stone

Announcement has been made through Senator Homer E. Capehart of Indiana that the price ceilings on Indiana cut limestone were lifted on September 7. Limestone producers of Indiana anticipated that prices would remain the same as those prevailing in 1940 and 1941. Perhaps this action presages some relaxation of other building materials ceiling prices in spite of O.P.A. Administrator Chester Bowles' recent statement.

Heavy Duty Truck Tires

Executive Secretary V. P. Ahearn of the National Sand and Gravel Association and National Ready Mixed Concrete Association has advised members that the sand and gravel industry has now been placed in Class 2 in the Essentiality List for heavy-duty truck tires, including off-the-highway and over-the-road operations, moving up from Class 3. The Essentiality List also has been amended to provide that "specialized equipment used in the haulage of construction material" shall be placed in Class 1, the highest classification. The Building Materials Division of W.P.B. has advised that a typical instance of specialized equipment is ready mixed concrete trucks.

Ask End of Price Control

Both the National Sand and Gravel Association and the National Crushed Stone Association plan to submit to O.P.A. new applications for the elimination of suspension of price control on sand and gravel and crushed stone, respectively. If this is not granted, an amendment to MPR-592 will be requested, striking out the provision that "price makes class" in determining price policies for individual producers in March, 1942. The National Lime Association also is seeking relief from this provision in MPR-592.

Limited Priority Controls

Although for most purposes W.P.B. priority controls will be out the window after September 30, order PR-29 issued on August 21 continues controls "for limited priorities assistance, where required in individual cases to assist reconversion or insure the continued fulfillment of essential civilian needs." Applications for the emergency CC rating are to be filed on Form WPB-541A (revised) at the nearest W.P.B. office, but other W. P.B. forms may be used if the necessary information is furnished.

Increase Gypsum Prices

An increase of $2.40 per net ton in manufacturers' ceiling prices for calcined gypsum plaster "bag goods," with the exception of small specialty packaged material, was announced by O.P.A., effective September 14, increasing ceiling prices about 20 percent. This price increase may be applied in the Eastern seaboard producing area. This area is defined as the New England States, eastern New York, eastern Pennsylvania, all of New Jersey, Delaware, Maryland and the District of Columbia; eastern West Virginia; in Virginia the counties of Loudoun, Fairfax, Arlington, Prince William, Fauquier, Accomac and Northampton; all of Mississippi, Alabama, Georgia, Florida, South Carolina, and part of North Carolina.

O.P.A. announced an increase of 2½c per square yard in the manufacturer's ceiling price for gypsum lath in California and Nevada, effective August 21.

Increase Lime Ceiling Prices

O.P.A. announced on August 13, an increase of $1.20 per net ton in northeastern producers' ceiling prices for building, chemical and industrial lime, excluding agricultural lime. The increase applies to all sales of lime in these classifications in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut and eastern New York. Former ceiling prices, frozen at the highest price charged by each producer of lime in March, 1942, to which $1.20 now may be added, range from $8 to $15 and average $9, f.o.b. plant.

NEARLY 3 YEARS' SERVICE

Where the Kiln is hottest . . .

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Unretouched photographs of B&W nose ring castings installed in May 1942 and still on the job. Castings were not cleaned before photographing.

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That's evidence of how B&W Alloy Castings stand up under severe, high-temperature conditions; how they reduce costly, time-consuming repairs, and replacement shut-downs.

B&W Alloy Castings are available in analyses to meet almost any requirement: resistance to corrosion, oxidation, abrasion, or other adverse conditions encountered in equipment for rock products operations. They can be furnished in practically any shape and weight, for service temperatures up to 2000 F., under conditions requiring high creep strength, consistent with long-time stability.

These Alloy Castings are produced in B&W's modern foundry, which is equipped with electric induction furnaces, heat-treating facilities, electric welding apparatus and X-ray inspection equipment.

Experience gained in helping others to solve equipment problems with B&W alloy castings is available to you without obligation.

S-60

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On Knowing Your Stuff!

MANY'S THE TIME I have wished my engineering education had embraced more on the detailed geology of rock, sand and gravel. Such knowledge as I have gained on this subject is the result of visits to rock products operations in many parts of the country, and from contacts with state geologists and amateur geologists among producer friends, of whom the late Miss Mary E. Squire, of the Allwood Lime Co., Manitowoc, Wis., will always be remembered most.

During the roaring 1920's when new plants were being opened weekly in these rock products industries, we of the ROCK PRODUCTS editorial staff were kept too busy catching up with developments to pay a great deal of attention to such fundamental considerations as the economic geology back of these developments. However, we were favored with numerous contributions by geologists on different phases of geology as applied to these industries, and our editorial library was the recipient of many volumes on the geology of the various states in the Union.

State Reports Valuable

We never did as much with these state geological reports as we should, at first for want of time to study them, and later for want of space to publish much of anything about them. However, we did, from time to time, call the attention of our readers to the value of these reports to their business ventures. As near as we can tell from our contacts with producer friends, their experience has been much the same; it is not until they get older and can take a more philosophical view of things, that they can find much time to learn something about the geology of their state and locality.

Looking back on our own experience, we can now readily appreciate that a working knowledge of the geology of a locality we were visiting would have added greatly to our understanding of many deposits of gravel or stone, and of the methods adopted for operating them. We had always observed a similarity and a peculiarity in the rock products plants of certain localities, and generally ascribed these to the fact that some successful operator initiated a certain style of operation, and that his competitors coming into the picture later followed his example.

That, of course, is true, but behind these practices are certain features in the geology of the region, which also account for some of the operating practices. Thus, whether any of the present operators realize it or not, they probably have been influenced in their choice of operating practices by a knowledge of the local geology. Not so very infrequently a new operator moves into a locality strange to him, and tries to show the natives a trick or two that he has learned in operating elsewhere. And, not altogether infrequently he finds out to his cost that the natives have good basic reasons for the kind of operations they had adopted.

With a new generation of rock products operators about to take over, it seems to us that the cycle should be reversed. They should be able to start out with a general picture of the geological factors involved in their business undertaking instead of ending up with such knowledge acquired by long experience.

New Series

We have been led into this reminiscing because with the current issue of ROCK PRODUCTS the editors are embarking on a series of articles considerably different from any that has been offered anywhere, prior to this time. In this series of articles they will endeavor to describe in the briefest possible manner the main features of the geology of each of the 48 states; abstract the specifications of the state highway departments for construction materials, especially mineral aggregates; describe briefly the kind and character of production of such aggregates; and point out the principal problems faced by producers in attempting to meet specifications.

Now, it may be that a producer, say in California, will at first blush, see no good reason why he should read an article on the sources of, specifications for and preparation of construction materials in Illinois. We might have thought the same once, but now we can see that a story of an operation in Illinois, or in California, can not be fully understood if one does not have in the background of his mind some idea of the geological set-up in each case. The highway engineers in California may be influenced in writing their specifications for materials by what their brethren in Illinois have done. Therefore, the producer in California who is asked to meet these specifications should have some knowledge of what the *raw materials* are in Illinois; or vice versa, for we have used these two states merely for illustration; we might have used any two others.

Suggestions for Producers

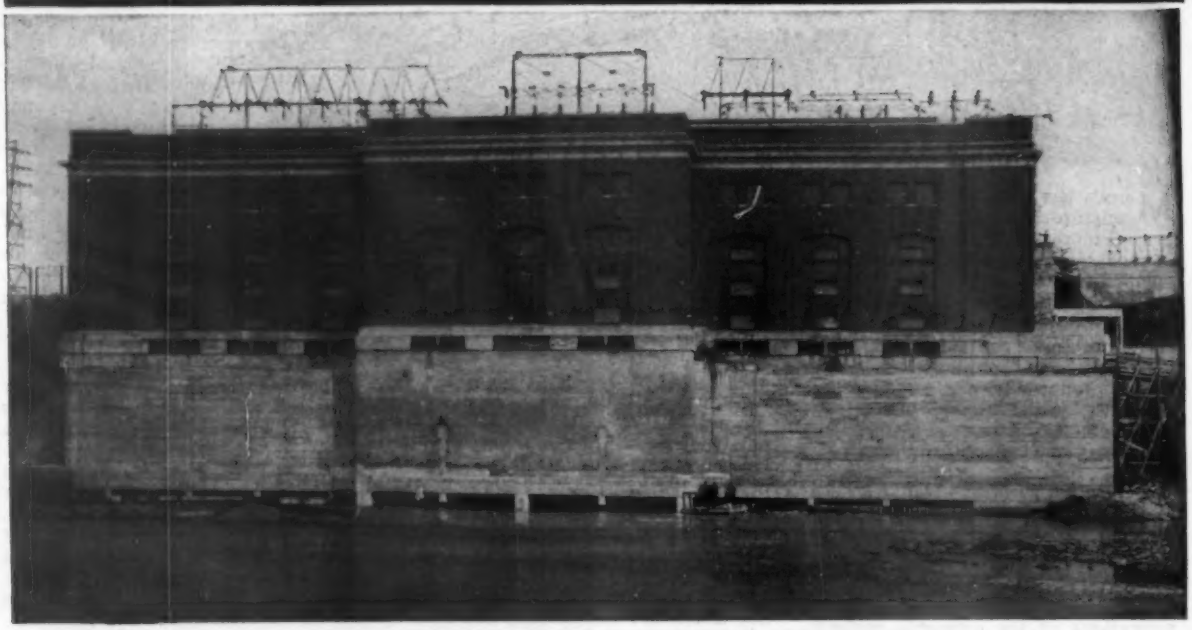
Moreover, we are sure that our illustrations showing how producers in one state or locality are meeting a particular problem, will offer suggestions to producers elsewhere on how to solve the same or a similar problem. Some of these problems, such as the recovery and blending of minus 50-mesh sand for concrete fine aggregate, are practically country-wide. One of the surprising things our studies and field trips have disclosed thus far is the difference in raw material deposits that may occur in adjacent states, yet, while the most important problems of processing are the same, the processing itself may be quite different.

We have found out by studies of our industry in Illinois, Michigan and Wisconsin why glacial deposits of gravel vary greatly even in adjoining states; and why all glacial gravels are not as good as is often assumed.

In the course of these studies the editors naturally accumulate a great deal of data that no space can be found for in this series of articles. Therefore, we hope our readers will not hesitate to ask questions, for we may have the answer in our collection of data; or in any event it will help us to look for similar data on our trips through other states. Also, the editors would be glad to have your reaction to this rather ambitious project—good or bad. After all, you know, the editorial staff exists primarily to serve you, the reader, with industry information—the know how—in so far as these editors see the light.

Nathan C. Rockwood

Structural Repairs at Hydro Station Made with Duraplastic Air-Entrained Concrete



Duraplastic air-entrained concrete was used for repairs at hydroelectric station of Western Massachusetts Electric Co. H. A. Moody, Hydraulic Engineer; Concrete furnished by Construction Service Corp., Springfield, Mass.; Daniel O'Connell's Sons, Inc., Holyoke, Mass., contractor.

FREEZING and thawing action during 28 New England winters developed spalling of the turbine scroll cases at a hydroelectric station of Western Massachusetts Electric Co.

New concrete curtain walls were constructed with Atlas Duraplastic air-entraining cement.

The engineer states that—

1. There was practically no segregation in the mix.

2. There was no appreciable water gain on top of the concrete walls after all the concrete had been placed in one continuous operation.

3. When the forms were removed, the surface was free of "honeycomb" spots and sand streaks.

For further information on Duraplastic, write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N. Y.

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AIR-ENTRAINING PORTLAND CEMENT

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RP-D-23

SUNDAY EVENINGS—American Broadcasting Company (Blue) Network—U. S. Steel's "The Theatre Guild on the Air"

the *Personal Side* of the NEWS

Visitor from Sweden

RUDOLF KILHOLM, works manager of the Köping plant of the Skänska Cement Co., with headquarters in Malmo, Sweden, was a recent visitor

Rudolph Kilholm

to Chicago where the editors of ROCK PRODUCTS had the pleasure of a short visit with him. Mr. Kilholm was in the United States on a month's business trip by air, during which he visited manufacturers of portland cement and machinery from coast to coast. While a Swede by birth, Mr. Kilholm spent some 13 years in the States back in the 20's in the construction of cement mills, so he wasn't exactly a stranger.

W.P.B. Director

GEORGE L. HOCKENSMITH has been appointed director of the War Production Board's Construction Bureau, succeeding John L. Haynes, who is expected to take up an assignment at the Department of Commerce in connection with the establishment of the proposed construction division of the Bureau of Foreign and Domestic Commerce. Mr. Hockensmith has served as deputy director of the Construction Bureau since July, 1945, and was chairman of the Construction Requirements Committee prior to that date.

Plant Manager

CHESTER H. CARMICHAEL, who has long been connected with the design, construction and operation of plants for the manufacture of concrete masonry units in this country as well as Bermuda, Canada, Hawaii, etc., is now associated with The I. L. Stiles & Son Brick Co., North Haven, Conn., as plant manager of the concrete division. Mr. Carmichael is a past-president of the Sand-Lime Brick Association. C. F. ANDREWS, vice-president, is to be general manager of the concrete division.

Becomes "Movie Czar"

ERIC JOHNSTON has been elected president of the Motion Picture Producers and Distributors of America, Inc., the so-called "Movie Czar" job held for 24 years by Will Hays who has resigned. Mr. Johnston will continue as president of the U. S. Chamber of Commerce. He also is identified with the rock products industry as chairman of the Washington Brick and Lime Co., Spokane, Wash.

Research Director

RODERICK B. YOUNG, assistant chief testing engineer, Hydro-Electric Power Commission of Ontario, Canada, has been appointed assistant director of research. Mr. Young, a past-president of the American Concrete Institute, also participates in the work of several committees of the American Society for Testing Materials.

Consultant at United Nations' Conference

FRED W. SMITH, vice-president of Saticoy Rock Co., Ventura, Calif., according to a recent issue of "Consolidated News," participated in the Conference of United Nations in San Francisco, Calif., by acting as a consultant to the United States delegation. Following is an excerpt from the speech he made under the auspices of the U. S. Office of War Information which was rebroadcast by short wave to Japan, Indo-China, China, Europe, and the Philippines:

"All of us who are here, I am sure, have learned many things we did not know before. We have learned, too, in greater degree than many believed possible, to recognize the viewpoints not only of other nations but of other groups in the United States. One thing which has impressed itself forcibly upon my mind is the apparent difference in the meaning of words in the minds of the various delegations. I knew something of these differences, of course, but did not before realize how many shades of meaning very simple words can take on. And I have learned how important it is that all of us know exactly what these words mean to all others concerned.

"We have, in our consultants' meetings, accomplished many worthwhile things. We have had something to do with the insertion of the words 'human rights and universal freedom' into the proposed charter. And the United States delegation has listened carefully to our suggestions and has adopted them in a number of instances. In our meetings we were able to overcome fears and prejudices and rivalry. Labor and management have seen eye to eye. In fact, labor organizations which had long been rivals readily agreed with organizations of business, and management, and professions and education. Church people of different faiths have mingled freely together. A wonderful feeling of comradeship has developed as a result of these consultants' meetings. Many close friendships undoubtedly will arise from these meetings.

"All of us are hopeful that a charter may soon be completed here in San Francisco. We do not think it will be a perfect charter; but we do believe it will serve to prevent future warfare, and that is what practically everyone is most concerned about. The imperfections, without doubt, will be eliminated in time. No one who came here had any thought that we could draw up a perfect document, but personally I feel that more has been accomplished here than most people realize. And as the years go by, and a clearer concept is obtained of what has been done in San Francisco, I believe all who have had a part in the Conference are going to be proud of what was done."

Fred W. Smith

Research Manager

WALTER J. McCOY, research chemist, Lehigh Portland Cement Co., Allentown, Penn., has been appointed manager of research laboratory. Mr.

Walter J. McCoy

McCoy has been associated with the company since 1938 and became research chemist in 1940. He received his B. S. degree in science and mathematics in 1936 from Eau Claire State College in Wisconsin, and his M.S. degree in analytical chemistry and physical chemistry from the University of Minnesota in 1938. During the war he taught evening extension classes for Pennsylvania State College in Engineering, chemistry and instrumentation.

Purchasing Agent

FRANK G. CORREGAN, superintendent of the Millville, W. Va., Moler dolomite quarry of the Pittsburgh Limestone Corp., Pittsburgh, Penn., has been appointed purchasing agent of the company. J. N. SULIOT, plant engineer of the Hillsville, Penn., quarry, succeeds Mr. Corregan as superintendent of the Millville plant. Mr. Corregan has been with the company 24 years, the last 18 as superintendent at Millville. He is a Cornell University graduate and served overseas in World War I. Mr. Suliot, a Purdue University graduate, has been with the company six years, the last three at Hillsville, Penn.

A.S.T.M. Elections

J. R. TOWNSEND, materials engineer of the Bell Telephone Laboratories, Inc., has been elected president of the American Society for Testing Materials. He has also been appointed a member of the A.S.A. Mechanical Standards Committee for the term of two years as representative of the A.S.T.M. Mr. Townsend succeeds H. H. Morgan of the R. W. Hunt Co., Chicago, Ill. R. E. Hess, assistant secretary of the A.S.T.M., continues as alternate representative. Mr. Townsend is also one of the representatives of the A.S.T.M. on the Standards Council of A.S.A. Members of the executive committee are: T. A. Boyd, head, fuel department, research laboratories division, General Motors Corp., Detroit, Mich., has been elected vice-president; John R. Freeman, Jr., technical manager, American Brass Co., Waterbury, Conn.; L. J. Markwardt, assistant director, U. S. Forest Products Laboratory, Madison, Wis.; Carlton H. Rose, chemist, National Lead Co., Brooklyn, N. Y.; and William A. Zinzow, chief physicist, Bakelite Corp., Bloomfield, N. J.

Limestone Co. Official

CLARENCE E. EHLE, vice-president and manager of The Cleveland Builders Supply Co., Cleveland, Ohio, has resigned from the company to accept

Clarence E. Ehle

a position as vice-president and general manager of the Indiana Limestone Co., Bedford, Ind. Mr. Ehle's son, Jay, recently with Stearns Manufacturing Co., Adrian, Mich., has returned to The Cleveland Builders Supply Co., resuming his old position in the concrete products division, and will soon take over two additional clay plants in connection with his present position.

Stone Representative

T. P. KUYKENDALL, cement sales representative for the Louisville Cement Co., Louisville, Ky., in the southern Indiana territory, will also represent the company in the sale of crushed stone and agricultural limestone and will devote a large part of his time to the sale of this product. The Louisville Cement Co., which was established about 1830, has been a producer of portland, masonry and natural cement, but prior to Pearl Harbor, according to Eugene D. Hill, president, the company installed equipment to increase the output of agricultural limestone. During the war, this equipment was available to supply quantities of stone for the construction of plants such as the du Pont powder factory in Charlestown, Ind. The company now finds itself in a position to begin supplying post-war farm and construction demands.

Director of Research

LT. COL. E. W. SCRIPTURE, recently returned from Europe after serving three years with the Army Engineers, will resume his position as director of research of The Master Builders Co., Cleveland, Ohio. Col. Scripture entered the service in 1942 as a captain, and was assigned to the Office of the Chief Engineer, European Theater of Operations. The first two years of his service overseas were in England where he took part in planning the invasion. In August, 1944, Col. Scripture went to France where he continued planning for engineering operations on the continent. He was awarded the Purple Heart, Bronze Star Medal, Legion of Merit, and presented with the Medaille, Louis de Broglie, by the Association des Engeineurs Docturs de France.

Named Plant Manager

E. BRADFORD HOLLINGSWORTH, production engineer for National Gypsum Co., Buffalo, N. Y., has been appointed manager of the York, Penn., lime plant. He will replace Gordon R. Lacy, who has resigned. Mr. Hollingsworth became associated with the National Gypsum Co. immediately upon his graduation in 1935 from Carnegie Institute of Technology, Pittsburgh, Penn.

E. Bradford Hollingsworth

Cement Plant Inaugural

STUART DUNCAN, chairman of the board of directors of the Marquette Cement Manufacturing Co., Chicago, Ill., accompanied by WALTER A. WECKER, president; D. S. COLBURN, vice-president; L. S. SAXBY, assistant to the president; GEORGE MOYLE of the LaSalle plant, and FRANK BAUMGARDNER of the Cape Girardeau plant, with their wives, recently attended the inaugural ceremonies at the plant of Cementos Veracruz, S. A., a subsidiary of Cementos Atoyac, S. A., at Orizaba, Mexico. High officials of the Mexican Federal Government were present as well as officials of the State of Veracruz and the cities of Orizaba and Cordoba. Among those present were SR. ING. GUSTAVO SERRANO, Mexican Secretary of National Economy (equivalent to Secretary of Commerce in the U. S.); SR. ADOLFO RUIZ CORTINES, Governor of the State of Veracruz; M. GARREAU-DOMBASLE, the Ambassador of France in Mexico; THOMAS H. LOCKETT, the Counselor of the American Embassy; the mayors of the cities of Orizaba and Cordoba; and JULIO LACAUD, president of Cementos Atoyac, S. A., and its subsidiary, Cementos Veracruz, S. A.

Also present were the following directors of the cement companies: Paul Bailleres; Luis Aguilar; Adolfo Desentes; Bernabé del Valle; Lic. Carlos Novoa; Alton J. Blank, general manager; V. E. Metcalfe, assistant general manager; C. E. Phillips, superintendent of construction; John A. Blank, consulting chemical engineer; José Maurer, chief of personnel; Charles C. Jagou, consulting engineer; J. F. Burkman, chief engineer; Miguel Braco, plant engineer; Manuel Lara, drafting department; Sr. Lozano, accountant; Torres Posadas, secretary; Manuel Torres, superintendent of power; Sr. Watson, mill foreman; Sr. Pacheco, chief chemist; Luis Garza, official of Atoyac Cement Co.; and other high officials of the company and its affiliates.

Senor Cortines, governor of the State of Veracruz, addressing guests at banquet. Seated at the table, left to right, are Senora Cortines; Senor Julio Lacaud, president of the company; Senora Gustavo P. Serrano, wife of the Secretary of National Economy, who also spoke at the banquet; and the Governor of Veracruz

The inauguration of the plant was begun when Mrs. Walter A. Wecker pressed a button which started operations in the crushing department; Mrs. V. E. Metcalfe in turn started up the drying department; Governor Adolfo Ruiz Cortines, pressed the button which started up the 8- x 35-ft. raw compartment mill; M. Garreau-Dombasle started up the burning department by pressing buttons which placed in operation the two kilns and coolers; Economy Secretary Ing. Dustave P. Serrano then started up the 8- x 48-ft. cement compartment mill, and finally, Mrs. Alton J. Blank pressed buttons starting the packing department in which the first bag of cement to be produced in the state of Veracruz was filled and loading of the first car of cement begun.

Left: Alton J. Blank, vice-president of the company. Right: V. E. Metcalfe, manager

Following the inauguration, light refreshments were served in the general plant offices on the plant site. The inauguration banquet was held at the Cidosa Club at Rio Blanco where the guests were entertained by Mexican musicians, dancers and singers, dressed in native costumes.

In response to remarks by President Lacaud of Cementos Veracruz, S.A., at the luncheon, president W. A. Wecker of Marquette Cement Manufacturing Co., said, "We appreciate the very nice things said about us by Mr. Lacaud and others but lest you have gotten the impression that we had a major hand in the creation of this new enterprise, let me assure you that that is far from the case.

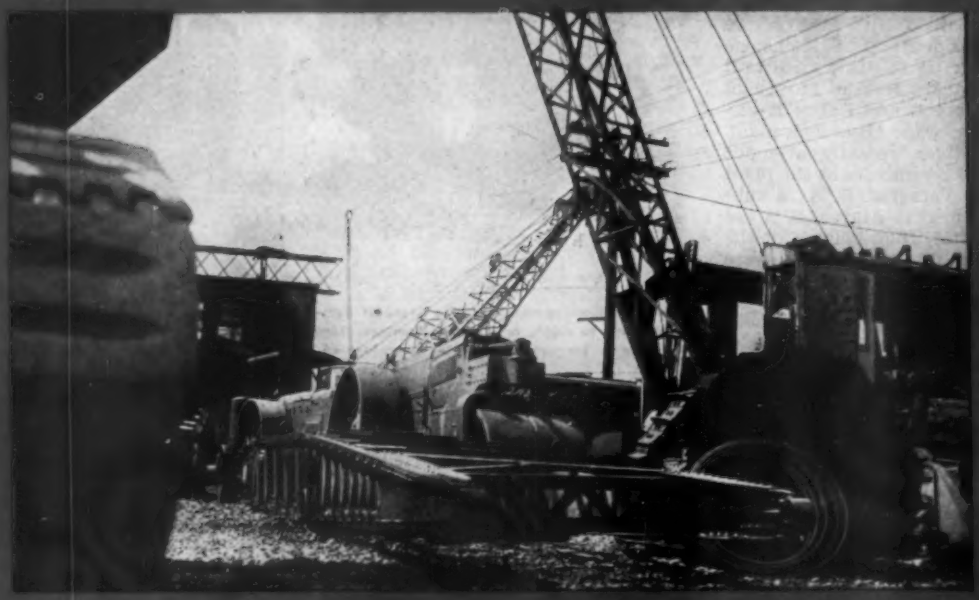
"In a small way—but in its larger sense—you and we are here dedicating ourselves to an operation in international co-operation. We are blending our respective skills for the mutual benefit of all and in doing so it may be that we will make some worthwhile contribution, in its larger sense, to the maintenance of the existing fine relationship between our respective countries.

"Much has been said about the skills we have here brought to bear. All this is very nice but it presents a one-sided story. On our part, it is a pleasure to say that we found here skill of a very high order. In fact, you have put us to a severe test in matching your own ingenuity and business astuteness.

"The result of all this is that we are richer in knowledge and understanding and, therefore, we say again that we are happy to be with you, and one of you, on this occasion."

Group of company officials, government dignitaries, and prominent guests at opening of new cement plant, Cementos Veracruz, S. A., between the cities of Orizaba and Fortin, Mexico. Senor Julio Lacaud, president of the company, in foreground, wearing dark suit; and Senor Adolfo Ruiz Cortines, governor of the State of Veracruz, facing camera and wearing dark tie

IN STORAGE—IN USE...



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TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT — CBS

NEWS OF THE INDUSTRY

Start Construction of California Gypsum Plant

STANDARD GYPSUM COMPANY of California, Oakland, Calif., has announced that work has been started on the new Richmond, Calif., plant. Cost of the new plant will run into several hundred thousand dollars. The construction program calls for a wallboard plant with a capacity of 200,000 sq. ft. per day, a calcining plant, steam plant, raw material storage space, and other buildings. The new development is an outgrowth of a deal consummated between Henry J. Kaiser and S. A. Perkins in July, 1944. At that time Mr. Kaiser entered into a postwar agreement with Mr. Perkins, president of Standard Gypsum Co., to lease, develop, and expand the plants and the market for Standard Gypsum products.

The company's Long Beach, Calif., facilities will be reconditioned and expanded in the near future. In addition to the Long Beach plant and the newly acquired Richmond site, the company owns property at Ludwig, Nev. The new processing plants will secure gypsum from deposits located on San Marcos Island in the Gulf of Lower California, Mexico.

Gravel Plant Improvements

J. FRED SMITH GRAVEL CO., Dallas, Texas, plans to make extensive improvements and changes at the Knight Spur plant as soon as equipment is available. A gasoline engine operated dragline, a Diesel locomotive, and a complete belt conveyor system will be installed. The plant is expected to be in operation with the new additions sometime in 1946.

Modernize Cement Plant

THE PENNSYLVANIA-DIXIE CEMENT CORPORATION, New York, N. Y., has announced that its Richard City, Tenn., plant is starting its program of modernization and expansion. This work is to be done as rapidly as possible to meet anticipated large demands for cement.

California Cement Plants to Modernize

CEMENT COMPANIES in California have under way plans for improvements and expansion of existing facilities. Santa Cruz Portland Cement Co., will erect a new kiln at Davenport, Calif., which will cost along with other improvements, about $1,000,000 and require a year to complete. Calaveras Cement Co. is modernizing its plant to manufacture new types of cement. Pacific Portland Cement Co. has a construction program which will be undertaken when conditions warrant. Permanente Portland Cement Co. will build an additional warehouse, but has no extensive construction plans.

Move Gravel Plant

EAST LANSING GRAVEL CO., East Lansing, Mich., is erecting a new plant at the present location, and is moving the old plant to a new deposit near Jackson, Mich. The new plant, capable of producing 100 cu. yds. per hour, will have almost entirely new equipment. Material fed into a hopper by a 1½-cu. yd. crane will be sent to a Barber-Greene belt conveyor by a feeder under the hopper. The conveyor will move the material to a single-deck 3- x 6-ft. Simplicity screen where stone over 1½ in. will drop to a 9- x 36-in. Cedar Rapids jaw crusher. The product from the jaw crusher can be sent to the washing and screening plant or to an 18- x 24-in. Diamond roll crusher. Material passing the screen and the crusher throughs go to another Barber-Greene belt conveyor which will carry material to a 3- x 12-ft. double-deck Simplicity screen for sizing. The material passing the lower deck will go to an 8-cu. yd. settling tank for reclamation of sand, which will then drop into a 45-cu. yd. bin. Two other bins, having 45-cu. yd. capacity each, will receive the gravel sized on the screen. The wash water overflowing the settling tank will go by flume into a Link Belt cone classifier for reclaiming fine sand. The overflow from the cone will be flumed to waste. Two 18-in. belt conveyors will be installed under the bins to carry material to stockpiles when the bins are full; one conveyor will be a Barber-Greene and the other a Russell. A 6-in. American Marsh pump will send wash water to the screens.

The older plant now being moved to the Jackson location is an all Cedar Rapids plant, with a 60-cu. yd. per hour capacity. John Angel is the owner of the East Lansing Gravel Co., and Archie Piper is superintendent. The new plant should be in operation by late Fall of this year.

Install Dust Collectors

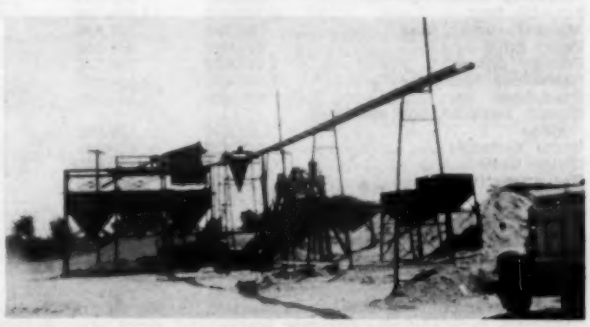
AETNA PORTLAND CEMENT CO., Bay City, Mich., recently installed Sly dust collectors in the finish grinding mill as part of a modernization program which will be completed by 1946. In addition, two new storage silos are to be built, new loading equipment for bulk cement will be installed and new dust collectors will be put in the packhouse. Some other revamping also will be done.

Open Ready Mix Branch

CONSOLIDATED ROCK PRODUCTS CO., Los Angeles, Calif., has augmented its ready mixed concrete service by the installation of batching units at Ventura, Calif., and at the Saticoy plant. Arno Stovall is in charge.

Open Quarry

DOUDS QUARRIES, INC., Douds, Iowa, is opening a new stone quarry several miles north of Farmington.



Left: Installation view of new plant, showing conveyor inclining up to scalping screen and crushers; to the right is the sizing screen and storage bins with cone sand classifier fed by flume. Right: Storage bins, classifier, and flume to waste

Iowa Stone Organization

IOWA LIMESTONE ASSOCIATION is the name of a new state organization of crushed stone producers which was formed at a meeting in Des Moines, Iowa, on August 23. Henry Huschke, managing director of the Agricultural Limestone Division and J. R. Boyd, administrative director of the National Crushed Stone Association, were in attendance at the meeting.

Officers and directors of the Iowa association follow: President, Paul M. Nauman, treasurer, Dubuque Stone Products Co., Dubuque; vice-president, Harry D. Bellamy, vice-president, Concrete Materials and Construction Co., Cedar Rapids; secretary-treasurer, Clint A. Allen, secretary-treasurer, Sargent Bros., Inc., Des Moines; directors: G. C. Hubbell, Des Moines; G. B. Clark, Midwest Limestone Co., Gilmore City; Verne Shield, Shield Bros. Limestone Co., Waverly; and W. F. Sharpe, Dillon-Sharpe Co., Centerville.

Crushed Stone in 1944

OUTPUT of crushed and broken stone in the United States in 1944 totaled 154,960,960 tons valued at $160,787,341, a decrease of nine percent in quantity and six percent in value compared with 1943, states a Bureau of Mines report.

Stone used for concrete aggregates and railroad ballast, 83,080,550 tons valued at $78,701,175, constituted 54 percent of the industry's production in 1944. Commercial operators in 1944 produced 88 percent of the 64,759,490 tons for concrete and road metal, 65 percent of which was moved by truck, 27 percent by rail, and three percent by waterway and 5 percent, not specified. Crushed stone for metallurgical purposes, 31,080,330 tons valued at $25,130,113, ranked next to concrete aggregates in quantity consumed; limestone for agricultural purposes, 18,941,220 tons valued at $25,316,219, increased 30 percent in quantity and 33 percent in value; refractory stone (gannister, mica schist, dolomite, and soapstone) amounted to $2,313,640 tons valued at $3,922,238, a decrease of 15 percent in quantity and 14 percent in value.

Portland cement and natural cement rock, not included in the above totals, totalled 24,148,000 tons in 1944, and stone for lime amounted to 12,947,000 tons.

Limestone constituted 74 percent of all crushed and broken stone, excluding cement and lime stone, sold or used by producers in the United States in 1944. Limestone sales and value figures for 1943 and 1944 are given below.

Wolverine Starts Kilns

WOLVERINE PORTLAND CEMENT CO. has announced that the Coldwater, Mich., plant, which has not been in operation for the past few years, has started up. The Quincy plant has been in almost continuous production. Improvements at the Coldwater mill include the rebuilding of the kilns, the installation of a chain and forced draft system for heat conservation in the kilns, the replacement of the old coal handling system by unit pulverizers, and improvements in the equipment used for digging and transporting marl from nearby lakes and in handling clay to both Quincy and Coldwater plants.

From Clay to Concrete

THE I. L. STILES & SON BRICK CO., North Haven, Conn., is erecting an up-to-date concrete products plant supplementing its clay products. The entire building is being constructed of Stiles Antique brick, including bulk cement silo, aggregate bins, curing rooms and main operating plant. The plant, with a capacity for manufacturing 9000 8-in. block per day, will have two Besser Vibrapacs. It will produce a general line of concrete masonry units and other concrete products, and it is anticipated the plant will be in production the latter part of this year. Special stress is to be laid on the manufacture of back-up block so that the two products of the company may be utilized in supplying the building trade with both clay brick and concrete block.

Open Gypsum Quarry

NATIONAL GYPSUM CO. has opened up a new quarry along the Des Moines river two miles south of its Ft. Dodge, Iowa, plant. Formerly, all gypsum rock was obtained from a mine located about five miles from the plant, but a gradual change-over is being made and eventually all rock will come from the quarry. In opening up the new quarry, an overburden from 45 to 65 ft. in some spots had to be removed. John Pitts, assistant superintendent of the Saltville mine was transferred to Fort Dodge to take over this operation.

Cement Production

BUREAU OF MINES reports that production of finished portland cement during July, 1945, totaled 9,237,000 bbl. or 8 percent above that reported for the corresponding month of the previous year. Mill shipments of 10,283,000 bbl. were 11 percent above the output of July, 1944, and 2 percent above the June, 1945, total. Mill stocks of finished cement at the end of July totaled 17,489,000 bbl., a decline of 14 percent from the stocks of the corresponding month of 1944.

The following statement gives the relation of production to capacity, and is compared with the estimated capacity at the close of July, 1945, and of July, 1944:

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	July 1944	July 1945	June 1945	May 1945	Apr. 1945
The month	44.0	45.0	45.0	40.0	36.0
12 months	41.0	39.0	39.0	39.0	38.0

Use	1943 Short tons	1943 Value	1944 Short tons	1944 Value
Riprap	2,786,780	$2,699,307	1,584,060	$1,828,330
Fluxing stone	31,570,650	24,505,567	31,080,330	25,130,113
Concrete and road metal	55,137,600	54,719,025	40,180,460	40,166,631
Railroad ballast	9,181,060	6,935,414	9,361,070	7,275,853
Agriculture	14,521,670	19,067,120	18,941,220	25,316,219
Alkali works	6,867,190	4,169,940	6,990,370	4,279,141
Calcium carbide works	526,920	538,425	509,860	476,292
Coal-mine dusting	194,360	497,258	196,470	624,217
Filler (not whiting substitute):				
Asphalt	440,510	887,908	449,560	855,480
Fertilizer	276,410	405,334	373,970	599,932
Other	178,250	570,664	236,720	677,522
Filter beds	36,260	74,586	20,880	44,064
Glass factories	504,930	811,991	512,710	820,150
Limestone sand	428,010	387,896	380,230	278,970
Limestone whiting[1]	296,370	2,068,098	352,490	2,554,728
Magnesium metal (dolomite)	887,830	891,350	652,610	983,359
Magnesia works (dolomite)[2]	203,240	242,974	220,160	450,328
Mineral food	293,490	1,394,705	254,150	1,193,706
Mineral (rock) wool	89,590	101,832	43,480	45,610
Paper mills	384,960	699,266	375,490	630,425
Poultry grit	119,080	700,163	130,450	701,194
Refractory (dolomite)	1,105,560	1,120,258	1,075,050	1,130,022
Road base	1,984,460	1,544,409	885,460	706,341
Stucco, terrazzo, and artificial stone	21,270	129,522	12,460	80,518
Sugar factories	347,320	658,209	254,410	431,462
Other uses[3]	292,790	480,927	202,140	438,703
Use unspecified	66,630	186,876	68,230	207,678
	128,743,190	$126,499,024	115,344,490	$117,926,988

[1]Includes stone for filler for calcimine, crayons, explosives, foundry facing powder, leather goods, linoleum, paint, paper, phonograph records, plastics, pottery, putty, roofing, rubber, wire coating, and unspecified uses.

[2]Includes stone for refractory magnesia.

[3]Includes stone for acid neutralization, brick glazing, carbon dioxide, ceramics, chemicals (unspecified), concrete blocks and pipes, dye, electric products, motion-picture snow, oil-well drilling, rayon, rice milling, spalls, spray, target marker, and water treatment.

Enlarge Block Plant

STANDARD BLOCK AND SUPPLY CO., Lansing, Mich., is making additions to the present plant in anticipation of a larger market for concrete and cinder units and building supplies. A new building, 43- x 43-ft., is being erected adjacent to the present building, and will house the new office as well as serving as a show room for building supplies. Under the new building will be steam curing rooms with a capacity of 3500 standard block. Other additions include a larger block machine, a bulk cement setup, and a complete new set of overhead bins. Production of masonry units is expected to increase from 2200 to 5000 units per day.

Open Quarry

RIDDLE QUARRIES, INC., Marion, Kans., has started operation at a quarry one mile southwest of this city. Both agricultural limestone and commercial crushed stone will be produced. The quarry will be headed by John H. Riddle as president. Other officers are David W. Wheeler, Jr., vice-president; Wharton Hoch, secretary; and Mildred Hunt Riddle, treasurer. The company holds a contract to supply 15,000 tons of agricultural limestone for use in Marion county. Plant capacity will be 1000 tons of agricultural limestone daily.

Buys Gravel Plant

THE F. F. MENGEL CO., Wisconsin Rapids, Wis., has purchased the Waupaca Sand and Gravel Co., Custer, Wis. A new, modern sand and gravel washing and screening plant will be installed, and later a ready mixed concrete plant and concrete block plant will be erected. Officers of the F. F. Mengel Co. are: F. F. Mengel, president; W. F. Mengel, vice-president; and Ann Mengel, secretary-treasurer.

Asbestos Research

THE JOHNS-MANVILLE CORPORATION, New York, N. Y., will build one of the largest research laboratories of its kind for the development of improved building materials, according to a company announcement. Dr. C. F. Rassweiler, vice-president and director of research, said that the first laboratory unit, in addition to research facilities, also will provide 10 experimental factories under one roof. This project is the first step in a 40 million dollar expansion program expected to provide 25 percent more jobs.

Take Over Sand Concern

ARTHUR F. STOBB, Snohomish, Wash., a city councilman and building contractor, and his two sons have purchased the Snohomish Sand & Gravel Co., plant from Paul Heyner. The plant has been closed for the past two years.

Why Rock Products Is Late

● A typographers' strike stopped work in practically all Chicago commercial printing plants thus delaying production of the October issue. The publisher of ROCK PRODUCTS was not involved in the dispute. It is planned to get back on our regular mailing schedule as rapidly as conditions will permit.

Modernize Quarry

DELL RAPIDS QUARRY CO., Dell Rapids, S. Dak., has been modernizing its quarry and crushing plant during recent years. Motor trucks haul the quartzite stone to the primary crusher in the quarry from which it is moved by hoist to secondary crushers. Water sprays are used to keep down dust in crushing. Fine dust carried away as sludge is dried and sacked to be used for manufacturing a polishing material. Don Frye is manager of the plant.

Stone Safety Contest

THE BUREAU OF MINES has announced that the 1944 safety competition conducted in cooperation with the National Crushed Stone Association resulted in 10 plants being operated with accident-free records. The Marquette quarry of the Marquette Cement Manufacturing Co., Cape Girardeau, Mo., had the best safety record in 1944, and the bronze plaque provided by the Explosives Engineer magazine was awarded to this operation. The ten plants receiving honorable mention are as follows:

Martinsburg limestone quarry, North American Cement Corporation, Martinsburg, Berkeley County, W. Va.; 82,370 man-hours.

White Haven sandstone quarry, General Crushed Stone Co., White Haven, Luzerne County, Penn.; 62,922 man-hours.

Union Furnace limestone quarry, Warner Co., Tyrone, Huntingdon County, Penn.; 55,319 man-hours.

Security limestone quarry, North American Cement Corporation, Hagerstown, Washington County, Md.; 48,716 man-hours.

No. 4 trap-rock quarry, Southwest Stone Co., Knippa, Uvalde County, Texas; 43,698 man-hours.

Jordanville limestone quarry, General Crushed Stone Co., Jordanville, Herkimer County, N. Y.; 43,047 man-hours.

Dunbar limestone mine, New Castle Lime and Stone Co., Dunbar, Fayette County, Penn.; 42,578 man-hours.

Catskill limestone quarry, North American Cement Corporation, Catskill, Greene County, N. Y.; 33,760 man-hours.

Winchester trap-rock quarry, General Crushed Stone Co., Winchester, Middlesex County, Mass.; 19,703 man-hours.

Middlefield No. 1 quarry, New Haven Trap Rock Co., Wallingford, New Haven County, Conn.; 14,943 man-hours.

Ready Mix and Block

DODGE CITY CEMENT PRODUCTS CO., Dodge City, Kans., has added ready mixed concrete batching facilities to its modernized concrete block plant. The Dodge City plant has been purchased by a firm headed by L. C. Kinzy of Kansas City, Mo., with G. A. Stannard of the Stannard Construction Co., and O. McGeorge of Wichita as partners. Roy Curry, son of the founder of the concrete block business, will continue as manager. New block machines with a "continuous mixer" have been installed along with additional curing facilities.

Dry Concrete Mix Plant

KKK GRADING CO. plans to build a dry concrete mixing plant at Minnesota Junction Corners just north of the intersection of Highways 33 and 26 near Horicon, Wis. A local report states the Messrs. Kuntz, Kapernick, and Kohn, from whom the company derives its name, are interested in the project.

End Mica Buying

UNITED STATES government purchases of mica in foreign countries will be terminated on or before December 31. The Foreign Economic Administration announced that purchases in Brazil and India will cease on November 1. W.P.B. plans to relax import controls of Order M-63 which will permit the importation of most mica without any government restrictions.

City Quits Stone Business

AFTER seven years of operation the city council of Keyser, W. Va., recently voted to discontinue the stone plant at Bull Neck. The property on which the plant is located formerly was owned by the Standard Lime and Stone Company. The Henderson Co., New Creek, W. Va., will supply stone needed by the city for street work.

Install Dust Collector

OREGON PORTLAND CEMENT CO., Portland, Ore., plans to install a $71,000 dust collection system at the Oswego, Ore., plant. The company recently completed the installation of two dust collectors, and the new purchase will largely complete this work.

Hardware to Ready Mix

WILSON HARDWARE CO., Washington Court House, Ohio, has announced that its plant on West Elm street is now producing ready mixed concrete. Willard F. Wilson and his son, Billie Wilson, are owners and managers of this modern plant. Bins have a capacity for four carloads of materials.

Asbestos-Faced Rock Wool

NATIONAL GYPSUM COMPANY, Buffalo, N. Y., recently decribed an asbestos-faced mineral wool insulation which is used on all types of combat Navy ships for fireproof insulation. Composed of resin-bound rigid rock wool, covered on one side with asbestos paper, this new product not only eliminates the danger of fire, but also is so constituted that it makes a flame-resistant, lightweight insulation which may be decorated.

Another war-born product which will have many peace-time uses is a packing felt which replaced inflammable excelsior in the packaging and shipping of electrolyte (sulphuric acid) for batteries. It consists of two 6x48-in. strips of mineral wool, backed on one side by waterproof paper, providing protection against breakage. In case the jars should be broken, the packing felt absorbs the liquid. This is important as battery acid is of a very corrosive nature and leakage might do irreparable damage to the rest of the cargo.

Labor-Management Unite

THE NATIONAL FOUNDATION FOR LATHING AND PLASTERING, Washington, D. C., has been formed to unite both labor and management in a national educational-publicity campaign to promote the interests of the industry. The Wood, Wire and Metal Lathers International Union, through Wm. J. McSorley, president, has joined hands with the Operative Plasterers and Cement Finishers International Association, of which John E. Rooney is president, and the Contracting Plasterers International Association, headed by Oscar A. Roum, president, to form an organization which will formulate Standards designed to promote the use of plaster and to emphasize its decorative values. Erwin Lurie, formerly with the War Production Board, and a construction engineer, will head up the work of the Foundation.

Standard Resumes

STANDARD PORTLAND CEMENT DIVISION of Diamond Alkali Co., Painesville, Ohio, has resumed operation. Operations were curtailed at the cement plant so that more labor would be available for the Diamond Alkali plant. Increased demands for cement, however, have made it necessary to start up operations under full production.

Open Ready Mix Plant

OLIVER E. DELAVAN, who has been allocation officer in the Office of Defense Transportation in Spokane, Wash., during the war years, has announced that he plans to install a ready mixed concrete plant in Coeur d'Alene, Wash. He was formerly identified in an official capacity with motor freight lines with headquarters in Coeur d'Alene.

Postwar Cement Demands

IT IS REPORTED that since the relaxation in L-41, cement orders in certain areas, particularly in the South, have risen as much as 15 percent. Increased domestic demand along with a sharp rise in export demand has caused a drop in stocks of more than 14 percent. Exports are expected to jump to 7,500,000 bbl. in the final quarter of 1945 as against 6,772,000 bbl. in 1944. The big export market is not expected to continue in volume after the British, Belgian and Dutch plants are restored to normal productivity. A very heavy domestic demand is anticipated in the coming year.

Blast Furnace Slag

OF the 11,506,185 short tons used or sold in the United States in 1944, the great preponderance of slag was in the form of screened, air-cooled, material, the principal uses being in non-concrete roads, concrete pavement and structures, and railroad ballast, according to Bureau of Mines. The first mentioned industry absorbed 5,196,737 short tons, the next, 1,032,699 short tons and the last named 2,911,634 short tons.

San Diego Cement Plant

CHICAGO capitalists are reported to be interested in establishing a cement plant on San Diego bay, San Diego, Calif., to supply the export trade to the Orient and South America and also local markets. The proposed project would convert waste CO_2 into "dry ice." Other plans include construction of a gypsum wallboard plant.

Buy Ready Mix Concern

F. W. KELLER, Cape Girardeau, Mo., has sold his ready mixed concrete plant to Markham & Brown, construction firm, who will operate the plant under the name of Cape Ready Mix. Markham & Brown also have opened a quarry on Highway 74, south of the city, and are now furnishing rip-rap stone to the federal government.

"Asbestos" Homes for Britain

TO PROVIDE emergency housing for Britons bombed out by German bombs, a large number of asbestos Nissen huts, similar to United States Army housing units, will be built in England. These temporary homes will be built of corrugated asbestos cement sheets applied over arched frames. The inside is lined with flat asbestos cement board.

Organize Ready Mix Concern

DUBUQUE READY MIX CONCRETE CO., Dubuque, Iowa, has been organized with the following officers: President, G. D. Rose; vice-president, Bart L. Molo; secretary, Harold E. Molo; and treasurer, Paul M. Nauman. This company is controlled by the same interests which operate Dubuque Stone Products Company.

Fibrous Talc Deposits

GEOLOGICAL SURVEY has made maps and sections of the Natural Bridge district, Lewis County, and of the Gouveneur district, St. Lawrence County, New York, which can be examined at Federal Works Bldg., Washington, D. C., in the office of the State Geologist, Albany, N. Y. The Gouveneur Reading Room Association, Gouveneur, N. Y., also has a set on file. Investigation of talc properties is continuing under the Survey.

Pavement Yardage

AWARDS of concrete pavement for August, 1945, have been announced by the Portland Cement Association as follows:

SQUARE YARDS AWARDED

	During August 1945	During 1st Eight Months, 1945
Roads	703,107	3,448,020
Streets and Alleys	1,030,084	3,349,440
Airports	248,282	7,266,892
Total	1,981,473	14,064,352

Add Conveyor

CONSUMERS GRAVEL CO., Grand Rapids, Mich., is planning to work an additional pit directly across a State Highway from the plant. Plans are being formulated to install conveyor equipment which will move raw material from the pit, under the road, to the plant. The new arrangement is expected to be in operation by 1946.

Start Block Plant

SYLVANIA CONCRETE BLOCK AND CEMENT PRODUCTS CO., Sylvania, Ohio, has been organized with G. C. Parker and Limerick L. Odom as partners. It is hoped to start operation in October. The plant will utilize sand from the old Indian Sand Pit.

Start Block Plant

HINDALL SUPPLY CO., Ada, Ohio with offices at 125 East College avenue, has set up a concrete block plant. George and Carey Bob Hindall are principal owners of the business.

Change from Gas to Coal

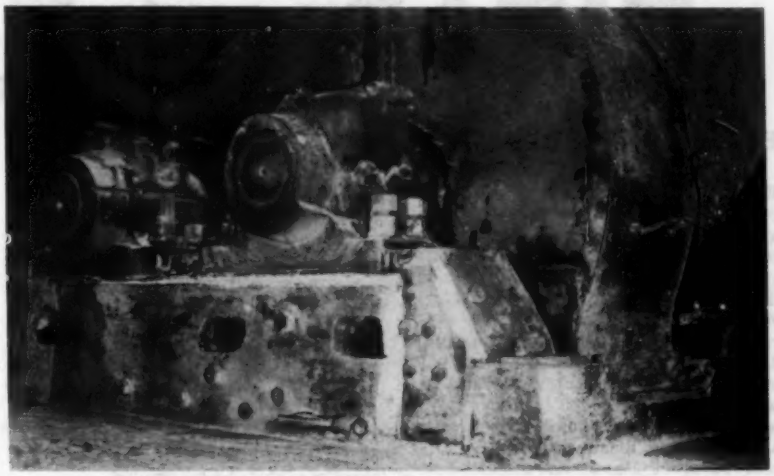
SOUTH DAKOTA STATE CEMENT PLANT has resumed operation after the kilns had been changed over from gas to coal firing equipment.

Cement Plant Repairs Heavy Castings

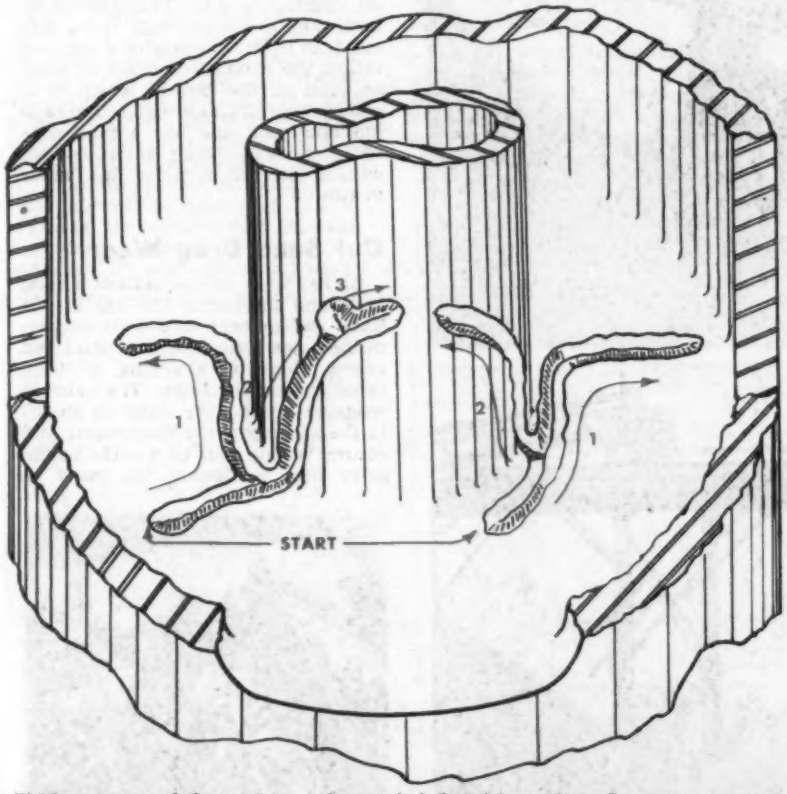
Two heavy welding jobs involving repair of heavy cast iron, performed in a southern cement mill, which demonstrate the utility and versatility of welding on complicated work, were described in an article in the August, 1945, issue of *Welding Engineer*, which is abstracted herein by permission.

One application was in the repair of a broken cast iron main drive base for a 10- x 280-ft. rotary kiln. The third train shaft had broken and the pinion was forced against the end of the base, causing it to break in a number of places. To change the base would have involved tremendous labor, since it was grouted into a concrete foundation, and a lengthy shutdown.

The job consisted of re-assembling 20 or so pieces of cast iron varying in thickness from 1 to 2½ in. and welding them together with a low-temperature nickel alloy welding electrode. The job consumed over 100 lb. of electrodes. For added insurance, a 1-in. plate was bolted and welded into place to reinforce the end of the frame in which the major breaks had occurred. The kiln was put back into service within a week at a cost of approximately $500, where a new base would have cost $3000 to $4000 installed, according to the article.



Repair cast-iron main drive base of rotary kiln by welding. Illustration shows completed repair with a 1-in. steel plate reinforcement welded in place



Welding sequence of the gyratory crusher repair indicated by numbers. One groove was completed before another was begun although welding was skipped from one side to the other. When the deposit became too hot to the hand, weld metal was deposited in the opposite groove. No preheat was employed

Gyratory Crusher Repair

In the second repair job described, a 30-in. gyratory crusher had developed a crack on the barrel of the cast iron main frame, which had progressed to the point where the eccentric bearing lost its lubricating oil. There was a total of 10 ft. 2 in. of cracks on both sides of the diaphragm, running up on the eccentric bearing barrel until the two ends nearly met. Thickness of the material in the diaphragm varied from 3 to 2¾ in., while on the barrel, it was necessary to fill up a groove 2¾ in. deep. The first step was to locate the ends of the cracks and drill holes through the base material to prevent extension of the cracks as chipping was undertaken. These holes were drilled on both the top and the underside of the diaphragm as well as on the inside and outside of the barrel inasmuch as the cracks did not end in the same place on both inside and outside. Chipping hammers were employed to vee the base metal from the top side nearly through the casting.

Welding Procedure

The welding was continuous and employed 5/32-in. copper-nickel alloy coated electrodes—designated as Eutetics No. 24—the same type used on the main frame repair job. The welding sequence is shown in the diagram herewith. About 10 in. of an electrode was deposited, then the weld deposit was thoroughly peened. The base metal was kept cool by shifting the work from the crack on the one side to the crack on the other, never allowing the deposits to get so warm that the welders couldn't hold their

(Continued on page 73)

HINTS *and* HELPS

Practical Ideas Developed by Operating Men

Efficient Stockpiling

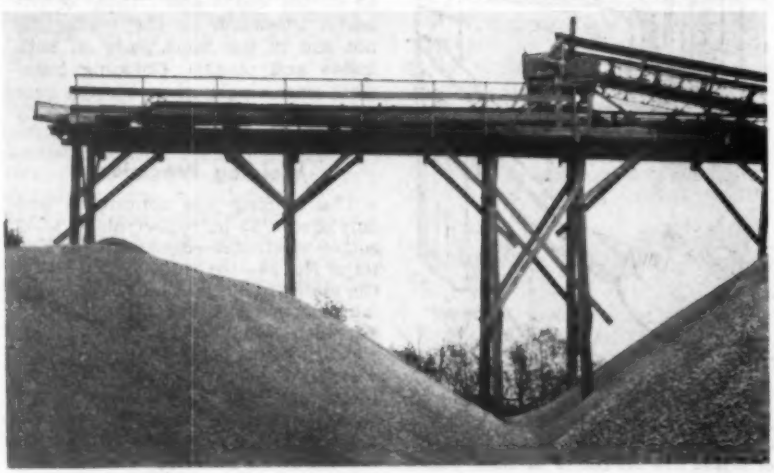
CRYSTAL LAKE CRUSHED STONE CO., Elkhart Lake, Wis., stocks the entire production of washed sands and gravel by a combination of horizontal, inclined and mobile, belt conveyors. Three adjacent gravel bins discharge onto a horizontal belt conveyor which, being the common carrier, can also be used for blending. This belt delivers to an inclined belt conveyor which elevates its burden to a height of about 35 ft. above yard level. The head spout is equipped with a gate so that discharge is either direct to stockpile or to mobile belt conveyor, as needed. The latter is 70 ft. long and mounted on a channel framework resting on railroad trucks spaced at approximately 14 ft. c.c. The track, made of light gauge rail, is about 140 ft. long and is supported by a wooden trestle. A handwheel geared to one of the trucks makes manual spotting easy. A reversible 3-hp. drive on this mobile conveyor makes it possible to stockpile at any point for the entire length of the track. This flexibility permits stocking of 4000 cu. yd. of various sizes of aggregate without intermixture of sizes.

To round out the stockpiling system, the torpedo sand is handled from the bin separately by an inclined belt conveyor which, by means of a curved monorail, pivots on a 50-ft. arc at a discharge elevation of 30 ft. Three thousand cubic yards of sand can thus be stockpiled.

Draining Bins

CONKEY SAND AND GRAVEL CO., North Aurora, Ill., has introduced a novel method of draining water from sand bins, by placing a vertical, screen-covered conduit in the bins over the discharge gates. The screen-covered conduit is made of two 2-x 6-in. planks with spacers to allow an opening of 8 in. The opening on both sides is covered with ½-in. wire mesh, to permit passage of water and retard the sand. This drain is made as high as the bin in which it is placed. Four drains are placed in each bin and each one has a pipe connected at the bottom which extends outside the bin to allow the water to run off.

Screen covered conduit, for draining sand bins



Above: Pivoting conveyor for topedo sand. Superstructure in the center is the monorail support. Below: Mobile conveyor and trestle. Note head end of inclined conveyor

Cut Sand Drag Wear

SAVING WEAR on the links of a sand drag and increasing the life of the links 300 percent has been accomplished at a central Illinois sand and gravel plant by wrapping a ¾-in. cable around the links. The cable is wrapped around the links, as shown in the accompanying illustration, and secured at the ends by a cable clamp, after first tightening the cable as

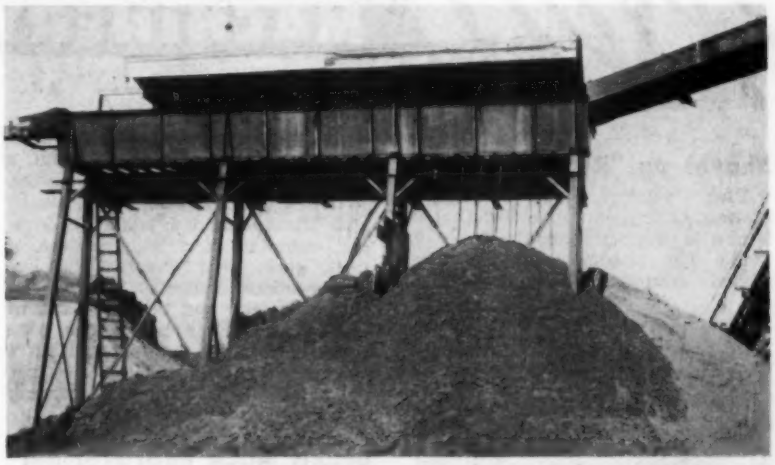
Wrap ¾-in. cable around sand drag links to save wear

much as possible. It is suggested that additional clamps be placed about every ten link lengths to insure better union, although the single cable clamp has served satisfactorily at this plant. The cable not only keeps the links in constant contact with the cogs on the driving wheel, but also takes up the pull when the links stretch and the pins become worn to the point that they become loose.

Sand Settling Flume

JOHN WASKIN, superintendent, Northville Sand and Gravel Co., Northville, Mich., is successfully recovering marketable sands from the last wet screening stage in the gravel producing plant with a settling flume of his own make. The illustration shows the flume, which is 36 ft. long and 40 in. deep. Note sand pouring through the holes onto stockpile. The feed launder enters the flume at the right. The exit launder is at the extreme left and carries the flume discharge with only very fine suspensions, to the waste pond 700 ft. distant.

Design details are shown in the two sectional views. Item (1) is 3/16-in. sheet steel welded up as shown to make the sides, bottom and ends of the flume with light angle-iron side reinforcements (2) spaced on about 4-ft. centers. A 2- x 12-in. wooden plank (3) bolted to the extension of the flume bottom has nailed to it a piece of 5/8-in. rubber belting (4). This is effective in making the seal over the holes (8) leak-proof when valve (5) is in the closed position. This valve, made of a piece of 2- x 4-in. wooden plank about 3 ft. long to provide a handhold, is covered with 16-gauge sheet iron (6), nailed on, which provides a good sliding surface against the rubber. A pivot bolt (7) with spring and washer



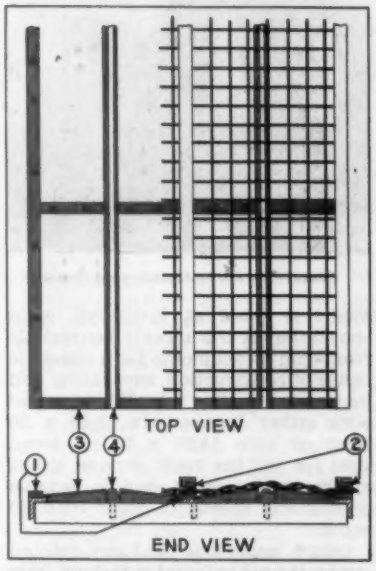
Settling flume in action. Note streams coming from draw-off openings

under the nut holds the valve (5) tightly against the rubber surface (4). The pair of 2-in. discharge holes drilled through the flume bottom, 2- x 12-in. plank and belting, must be on the same centerline as the pivot bolt. The valve assembly spacings are about 16 in. A pivot of 10 or 15 degrees is sufficient for the valve to clear both holes.

Increase Screen Cloth Life

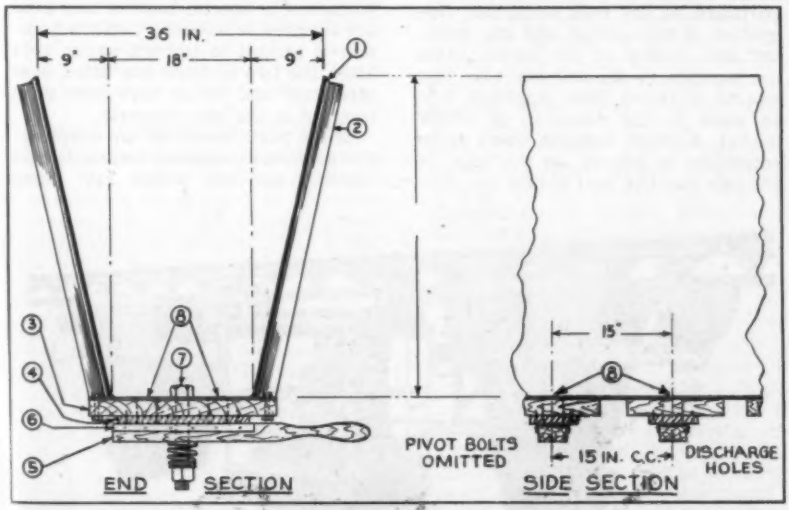
A LARGE IOWA sand and gravel producer had considerable expense replacing cloth on vibrating screens which had failed by breaking long before wear showed up. Vibration transmitted from the frame to the wire was of course causing the failure due to fatigue. No amount of tightening prevented this trouble. However, a highly satisfactory solution was finally worked out with the use of rubber strips and bars, installed as shown in the illustration.

The illustration shows a standard screen frame composed of welded up elements of channel angle and bar. Riveted to the angles are 1/2-in. thick rubber strips (1) with identical strips fastened to the screen hold-down



Plan and end view of screen cloth installation to prevent failures from vibration

bars (2). A molded rectangular rubber bar (3) with a slope, shown in the end view, is riveted to the cross channels. The large end is approximately 1 in. thick, and four pieces per cross channel are used for frames 48 to 60 in. wide. They function as retainers for the wedge-shaped rubber bars (4) running the length of the frame but only resting on the bar iron stiffeners. The shape of the end pieces (3) assures full contact of screen cloth on rubber between hold-down bars, a very important factor in eliminating vibration.



Sectional views of sand settling flume. (1) Sheet steel sides; (2) angle iron reinforcement; (3) wooden planks; (4) piece of rubber belting; (5) valve; (6) sheet iron wear plate; (7) pivot bolt and spring; (8) draw-off holes

new MACHINERY

Shovel on "Rubber"

THE GENERAL EXCAVATOR CO., Marion, Ohio, has announced that it is now in production on the Type 10, Model 105, pneumatic-tired combination crane-shovel-dragline. This

Convertible one-half cubic yard shovel

model is rated at ½-cu. yd. as a shovel, but it has quickly convertible front-end attachments for a complete range of construction, excavating and materials handling jobs. It is equipped with either four or six 10.00 x 20 tires, or with 14.00 x 20 rib tread tires for "off the road" service, it has air booster steering, and is capable of highway speeds of more than 20 m.p.h.

Other important features pointed out by the manufacturer include fully independent travel, swing and boom operated by the "finger" touch of a lever activated by metered air control. It has optional 4-wheel drive; four speeds forward and reverse; self-counterweighting machinery; heavy-duty engine, transmission and clutches.

Dust Sampling Units

MINE SAFETY APPLIANCES CO., Pittsburgh, Penn., has developed all-glass sampling units for use with the company's Midget impinger. The impinger, used in dust sampling, is a small, compact portable instrument.

The all-glass sampling units consist of a flask and nozzle with a standard taper ground-glass stopper. A fritted glass bubbler also is available. This equipment makes possible the sampling of a wide variety of dust, gases, and vapors. The impinger nozzle orifice is fixed at the correct height and no readjustment is necessary. Each nozzle has been checked to insure a flow of within 4 percent of one-tenth cubic foot per minute at 12-in. vacuum, according to the manufacturer.

Brake Block Improvement

RAYBESTOS-MANHATTAN, INC., Passaic, N. J., has announced a patented brake block, known under the name of Key-Lok, which is said to have certain advantages over the bolt-type method of attaching brake blocks. It consists of lateral "fish-tail" metal strips or keepers in which bolts are inserted, spaced to fit in the brake bands. These keepers slide into fishtail slots cut into the block.

It is also claimed that by this means the bolts, bands, or shoes never need be removed for relining; all that need be done is to loosen the keeper nuts slightly, slide off the old and on the new, tighten the bolts and make the normal adjustments, eliminating hours of labor as well as the danger of springing the band out of its proper radius.

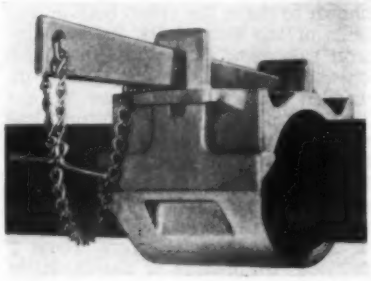
Double-Bucket Carrier

THE CLEVELAND CRANE & ENGINEERING CO., Wickliffe, Ohio, has brought out a motor-driven cab-operated double bucket carrier for the transportation of dry bulk materials. Operation of the carrier and the opening and closing of the bucket gates are handled by the cab operator who sits on a swivel chair enabling him to work in the direction of either bucket. A single variable speed drum controller is located on one side of the cab, but two foot brakes are provided, one at either end so that one is always in convenient reach of the operator regardless of which direction he is operating the carrier. Push-pull levers for opening the bucket gates extend into the cab and permit emptying the materials in any amounts and at any rate desired.

In the illustration is shown a unit with two 25-cu. ft. buckets designed to carry a total load of two tons. Two motorized travel drives, one at each end, operate the carrier at speeds up to 600 f.p.m.

Faster Coupling

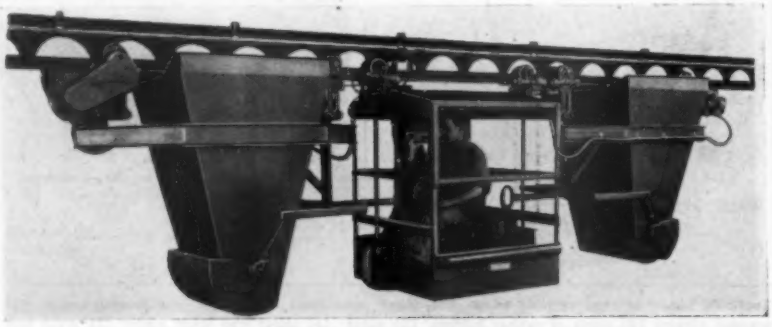
DRINKWATER, INC., Chicago, Ill., has developed a flexible pipe coupling, known as Presto-Lock coupling, which is made in eleven sizes from 1¼- to 16-in. According to the manufacturer, an important feature of this coupling is that it can be



Flexible, but tight, pipe coupling

used with any plain end pipe without threads, grooves or flanges. No wrenches or special tools of any kind are required in assembly; only a hammer is needed to tighten wedge keys after the two sections are fitted over pipe ends and wedge keys have been inserted in the key channels.

Three parts comprise the coupling; two corrosion-resistant malleable iron castings and the wedge key. Sizes

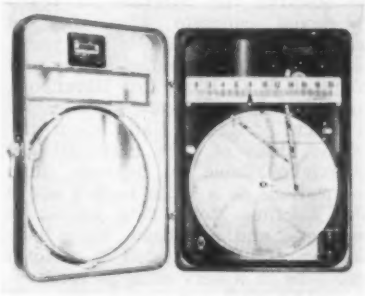


Overhead carrier with two 25-cu. ft. buckets for handling dry materials

1¼-, 1½-, 2-, 2½- and 3-in. are equipped with one wedge key and chain assembly to prevent loss of coupling parts, but sizes 3-in. to 16-in. have two wedge keys but no chain assembly. Gaskets used on all Presto-Lock couplings have been specially designed to effect a tight seal on all types of pipe lines, and include synthetic rubber, neoprene and natural rubber. It is said that up to 40-deg. flexibility is provided at each joint.

Potentiometer Controllers

THE BRISTOL CO., Waterbury, Conn., has announced a new series of electric-type potentiometer controllers. Five basic control unit types are available; three are electric contact,



Electric-type potentiometer controller

known as Microact controllers, and the other two are electric-proportioning and current-input types.

Microact units are provided with one, two, and three precision-type toggle switches, respectively, and six different terminal board connection arrangements to meet a wide assortment of control circuit requirements.

Proportioning controllers may be used with any type of electric proportioning valve, and may be had with resetting contacts if required. The proportional current-input controller is primarily designed to provide close temperature control of electric furnaces and ovens.

Large Capacity Scraper

LA PLANT-CHOATE MANUFACTURING CO., INC., Cedar Rapids, Iowa, has introduced an 8½-cu. yd. post-war scraper (11 cu. yd. heaped) incorporating features developed over a period of two years by actual field tests.

Featured in this model (C-108) is a floating apron which opens 30 in. before the rear gate moves, permitting adjustment of the apron to any position before loading. The apron clears the load completely as the rear gate starts to move forward, thus preventing any compaction of load between gate and apron. The open top bowl permits loading by shovel, dragline, or elevating grader, and the high lift of the apron is said to enable the scraper to discharge

Scraper which has a capacity of 11 cu. yds. heaped

any type of material from the bowl, including rock or sticky gumbo.

The scraper is the front-dumping forced ejection type, designed to facilitate spreading, which is possible from ½ in. to 18 in. The bowl can be raised and lowered quickly due to the cam action on the bowl lift cable. This is said to be very advantageous when loading sand, gravel or loose material as it is possible to produce quicker pumping action. The length of the scraper is 27 ft. 3 in., width 10 ft. 5 in., and height 7 ft. 8 in. It weighs 14,500 lbs.

Weld Large Castings

(Continued from page 69)

hands on the deposited metal immediately after peening. This caution was to eliminate setting up strains due to excessive heating in the base metal.

After deposition of all the weld metal on the outside of the diaphragm and the barrel, the welders moved inside. First they chipped out the remaining portion of the crack on the inside and then deposited a light bead overhead and peened it to bring the job up to size.

The job was completed after 220 hr. of continuous welding, using 226 lb. of electrodes. The casting had to be kept cool and preheating was not employed because the location of the cracks necessitated welders working inside the casting. On this job, the welding repair cost, including welders, helpers and materials, was approximately $900, and it was estimated that $600 should be charged to the job of dismantling and reassembling the crusher. The crusher was out of action about three weeks.

Bag Dumper

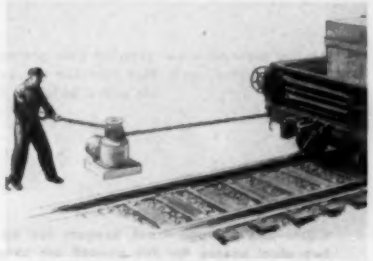
ASCO MANUFACTURING CO., LOS Angeles, Calif., has developed the Ritchie bag dumper for lifting and emptying heavy bags of cement or other dry materials. It operates with a ¼-hp. electric motor. An automatic shut-off switch stops the motor at top and bottom positions of the lift, and it also has a special clutch arrangement which disengages the motor if the downward return of the chute is obstructed. The upward lift takes 10 seconds with eight seconds to lower.

Machine to lift and dump bags

An adjustable height chute at the front fits narrow openings and funnels the bags' contents into the mixer or other machine. Two spikes catch and hold the bag while dumping.

Car Puller

AMERICAN ENGINEERING CO., Philadelphia, Penn., has introduced its Class 2½ Lo-Hed car puller. This hauling device has the barrel, gear box and motor integrated in a single, streamlined unit. Starting line pull is 5000 lbs., using a single line, or more with various block combinations.

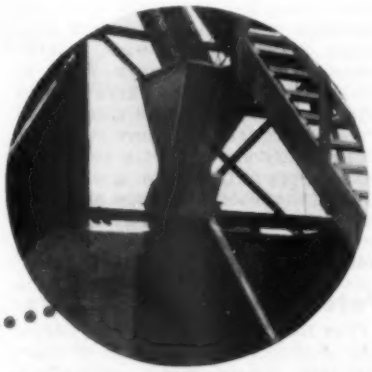


Car puller with starting line pull of 5000 lbs., using a single line

WEIGHING Out Seven Aggregate Sizes and Ready Mixed Concrete

By O. H. WUSTRACK

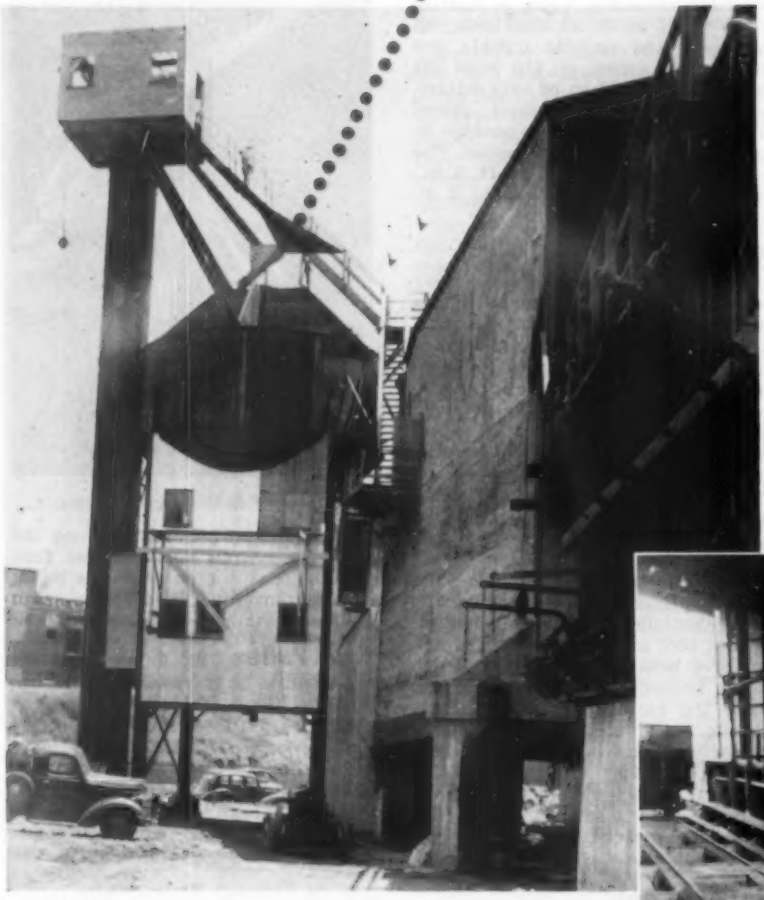
W. G. Block Co., Davenport, Iowa, builds unusual material handling plant with bin storage capacity of 2000 tons



Turnhead spout above bin compartments; batching floor below

COMBINING the batching of ready mixed concrete with that of weighing out aggregate to bulk users, is very smoothly handled at the new plant of W. G. Block Co., Davenport, Iowa. Ready mixed concrete capacity is 80 cu. yd. per hr., and seven different kinds of bulk materials are quickly available for delivery. Such innovations as a 7-bin hopper above the batching floor, twin aggregate batchers, and a 5-beam scale have been carefully integrated to perform two jobs in a very efficient manner.

All aggregate and cement comes in by rail over a covered trestle having 15 storage bins for gravel plus two cement bins. Seven hopper cars can be unloaded simultaneously into a storage space totaling 2000 tons. Two capstan car pullers, one of latest Link-Belt model, and operated from convenient push-button stations facilitate unloading, using the minimum of manpower.



Above: General view showing bulk storage bins at right; batching plant in center. Note that roof has not yet been built over circular bin above batching floor

Right: Bulk storage track hoppers for aggregate and cement. The two steel covers for the cement are shown in the background between the rails

An ordinary dump truck converted to hopper type, bottom dump, shuttles back and forth from the trestle bins to the hopper feeding the bucket elevator discharging to bins above the batching floor. The cycle distance for the truck is less than 200 ft. and since the operation takes place at ground floor elevation the cycle time is only about one minute.

The hopper is equipped with a reciprocating plate feeder designed by W. H. K. Bennett of Chicago, Ill., and the feeder is driven by chain off the tail shaft of the elevator thus preventing the choking of material in the boot when the latter does not operate. The feeder and boot are set below ground level in a spacious concrete well. An automatic electric sump pump keeps the floor dry, completing the impression that this key point of operation has been designed to facilitate quick and easy repair.

The elevator which consists of 12-in. steel plate buckets attached to forged steel Link-Belt chain elevates the material 85 ft. to discharge into any one compartment of a 7-compartment, 450-ton, cylindrical, cone bottom, bin built by Graver Tank Co. A Blaw-Knox turn-head spout with cable control at the hopper fixes the proper discharge point.

Dual Purpose Batching

Batching equipment is Blaw-Knox equipment but with certain variations incorporated in the flow scheme by the company to best serve the double duty imposed on it. To this end, each of the seven compartments can discharge into one or the other of a pair of twin 4-cu. yd. aggregate batchers. Several advantages accrue from this arrangement. Thus, if a change in batching must be made after a portion is already weighed, that batch can be left in the batching hopper and the correct amount weighed out in the twin batcher with almost no time lost. The principal feature, however, is that this arrangement makes it possible to weigh out material for the bulk customer without interfering with the ready-mixed concrete operation. This obviates weighing the empty truck and again the same truck full, on platform scales. A 5-beam Winslow batching scale, having two 10,000-lb. and three 5000-lb. beams, is used for this dual purpose.

The twin batchers are also useful when making up aggregates to certain special specifications, as for instance those of the U. S. Government calling for sand with a certain minimum percent finer than 50-mesh and 100-mesh, that is higher than ordinary. As the average torpedo sand is deficient in these sizes, the specifications are easily and accurately met by weighing up simultaneously the proper proportion of fine sand to normal torpedo sand as an admix.

The water weighing system embodies some time-saving features. It is measured from a 200-gal. tank as needed merely by setting of the beam weights. The rest is as automatic as the concrete batching, a solenoid-operated valve in the discharge line

Left to right; J. R. Northington, vice-president; E. W. Mainwaring, manager Davenport, Iowa, plant; and C. A. Mainwaring, president

cutting off after the exact weight is discharged. Thus the batching operator is free to devote more of his attention to the gravel batching which has a manual cut-off.

An innovation is found in the relative arrangement of the discharge points of the water, aggregates, and cement into truck mixers. The water delivery is between the twin aggregate gates so that no difference derives from the use of either one or the other of the gates for batching. The cement delivers at a point some few feet separated from the water and aggregate discharge. The cycle scheme calls for delivery of water and aggregates into the mixer truck first, followed by the cement addition afterwards. This requires spotting the truck twice, once for the water-aggregate, and again for the cement. The company feels that the added time consumed in spotting, however, is but a small price to pay for the advantages derived. These are (1) practicability of weighing out aggre-

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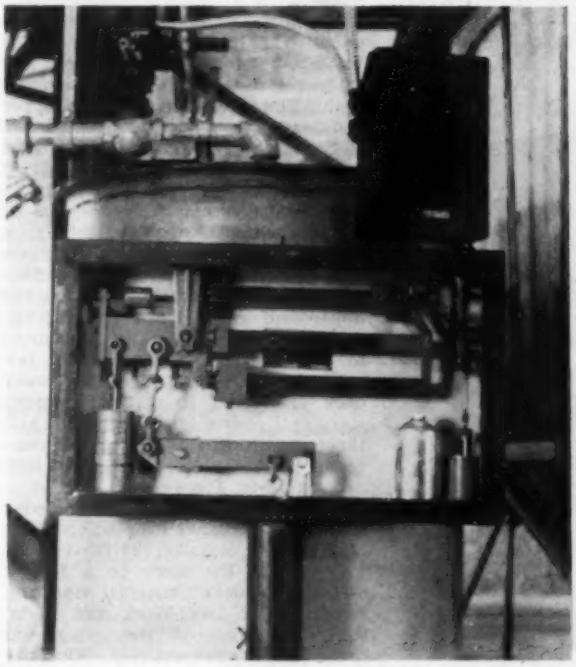
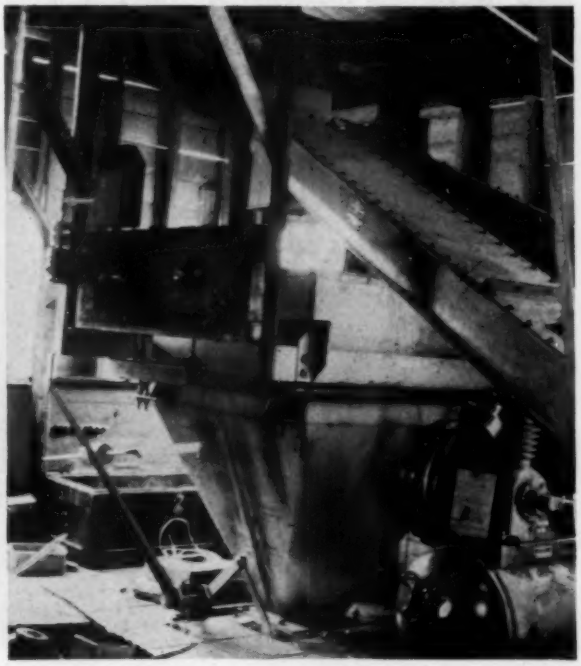




Left: Water tank and scale. Solenoid valve may be seen, upper left, on discharge line. Right: Cement batching hopper showing the two screws coming from the separate storage bins. Two push-button controls may be seen mounted on column at left; compressor to supply air for aerating cement is to the right

Primary Crusher in Quarry Cuts Haulage Costs

Avondale Stone Co., Chattanooga, Tenn., installs long conveyor to transport primary crusher product to plant for secondary crushing and screening

By H. E. SWANSON

F. H. Brown, president of the company

INSTALLATION of a primary crusher in the quarry and a long belt conveyor to move stone between primary and secondary crushing operations has doubled production and effected savings in time and money for the Avondale Stone Co., Chattanooga, Tenn. Before September, 1944, stone was taken from the quarry and trucked to the crushing and screening plant, a distance of more than ¼ mile. Now, the truck haul is just a couple of hundred feet, at the most. The change has meant that fewer trucks are needed, and the feed to the plant is more uniform. Labor costs for hauling have been reduced more than half and production capacity has increased from 30 to 60 tons per hour.

Quarrying operations were started at this location in 1935. Another site, opened in 1932, was worked until 1943, when a labor shortage became so acute that only the present quarry is worked. Both locations are in the corporate limits of Chattanooga, and the present site was chosen to remain in operation in preference to the other because it is a little farther from the heart of the city. This location, comprising an area of about 10 acres, has a 75-ft. face of seamed dolomitic limestone with a calcium carbonate equivalent of about 96 percent.

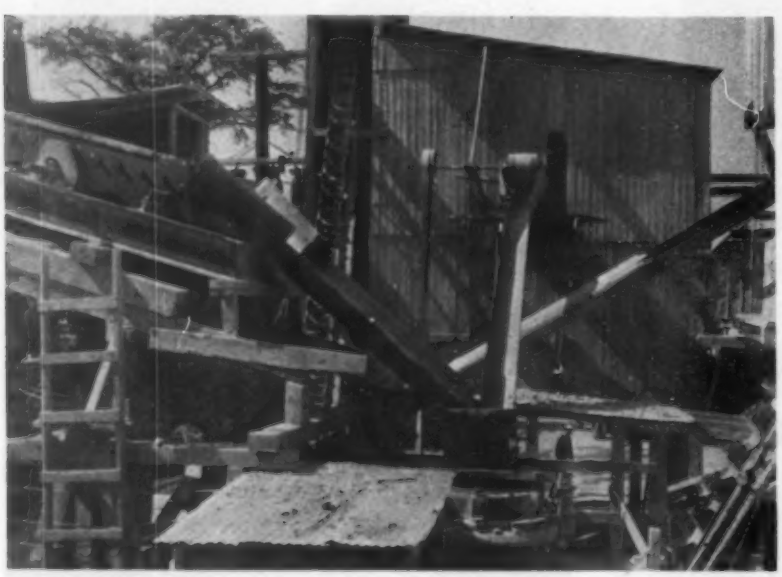
Drilling and Blasting

Overburden, averaging 12 ft. in thickness, is stripped by a No. 15 Northwest crane with a ½-cu. yd. bucket. Holes, starting at 2½ in. and tapering to 1½ in., are drilled to a depth of 30 ft. by a Sullivan wagon drill, the face being worked in three benches. A single row of about nine holes, spaced at 10 ft. with a 10-ft. burden, are shot at one time, the relatively small number being due to the nearness to the city. The seamed stone breaks cleanly and little secondary shooting is necessary, although two Chicago Pneumatic jackhammers are available for this purpose. Primary shooting brings down about 600 tons per blast, using 40 sticks of 1½ in. dynamite per hole.

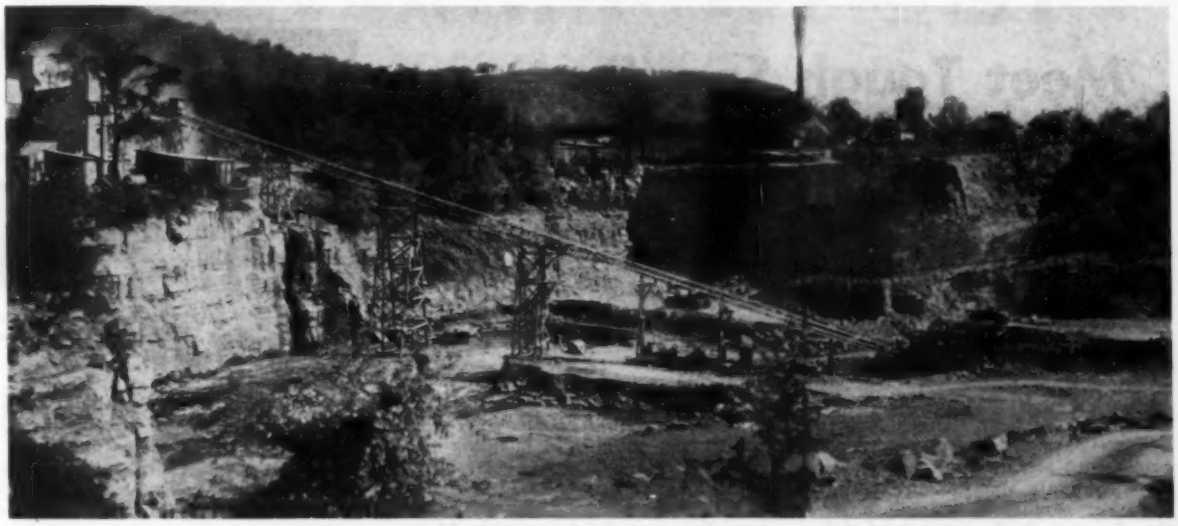
Crushing and Screening

Three 1½-ton Ford trucks haul stone to the primary crusher, and keep a constant flow of material going to the plant, a condition which was not possible when the trucks had to travel the longer distance to the plant. The trucks dump into a hopper above a 30-in. x 10-ft. Pioneer apron feeder which regulates the flow to a 15- x 36-in. Universal jaw crusher. Crusher throughs drop to a 24-in. Barber-Greene belt conveyor, 279-ft. centers, which moves the stone to a 4- x 10-ft. double-deck Pioneer vibrating screen. The screen has 2½-in. and 1-in. square openings on the upper and lower decks, respectively. Oversize from the top deck is chuted to a 9- x 3-ft. Cedar Rapids jaw crusher, stone retained on the lower deck is chuted to a 3-ft. Symons standard coarse-bowl crusher, and throughs drop to an 18-in. belt conveyor, 16-ft. centers, which feeds into a 30- x 18-in. Pioneer roll crusher.

Crusher throughs from the Cedar Rapids jaw crusher drop to the boot of a bucket elevator, 34-ft. centers, which takes the stone to a 3½- x 8-ft. double-deck Universal vibrating screen which has ¾-in. and ⅜-in. square openings on the upper and lower decks respectively. Oversize flows by chute to the cone crusher and the other two sizes drop to storage bins as finished products.



Oversize from the top deck of vibrating screen goes to jaw crusher, below to the left, and stone retained on the lower deck is chuted to the coarse bowl crusher, below in the center foreground. Bucket elevator carries jaw crusher throughs to the plant for sizing over another double deck screen



Overall view of quarry with primary jaw crusher, to the right, and long conveyor inclining up to the plant for secondary crushing and screening

The product from the cone crusher moves by bucket elevator, 42-ft. centers, to a 3- x 20-ft. revolving screen which has 5/8-in. openings. Oversize goes to the rolls and throughs drop to a storage bin. From the roll crusher, stone flows by a bucket elevator, 43-ft. centers, to a 3½- x 8-ft. double-deck Universal vibrating screen with ½-in. and ⅛-in. square openings on the upper and lower decks. Oversize is returned to the rolls and the other two sizes are chuted to bins as finished products.

This crushing and screening system produces 10 sizes of stone which are kept in 10 storage bins with a total capacity of 300 tons. All bins have bottom-discharge gates for truck loading. In addition to bin storage, several stockpiles are maintained. Loading from stockpiles is handled with a D-4 Caterpillar tractor equipped with Traxcavator having a ¾-cu. yd. bucket. About 80 percent is hauled by truck and the balance by rail. Truck haulage is on a contract basis with local trucking firms. At present, the principal market is to County and State, with some sales to local ordnance plants.

Most of the production is concentrated in the ⅜-in. and ½-in. sizes at present, although the quality of the stone is also desirable for agstone. The plant is flexible enough to produce a good percentage of agricultural limestone when demand warrants.

F. H. Brown is president of the Avondale Stone Company.

Wisconsin Agstone

DR. C. J. CHAPMAN, Soils Department, University of Wisconsin, Madison, Wis., has submitted the following figures covering the production of agricultural limestone from 1937 to 1944 inclusively:

1937	621,494	tons
1938	476,145	tons
1939	395,660	tons
1940	771,029	tons
1941	876,387	tons
1942	1,461,380	tons
1943	1,120,036	tons
1944	1,932,709	tons

The figures up to and including those of 1941 represent that of the efforts of private contractors, but the years following represent the combined production of strictly private producers plus the A.A.A.

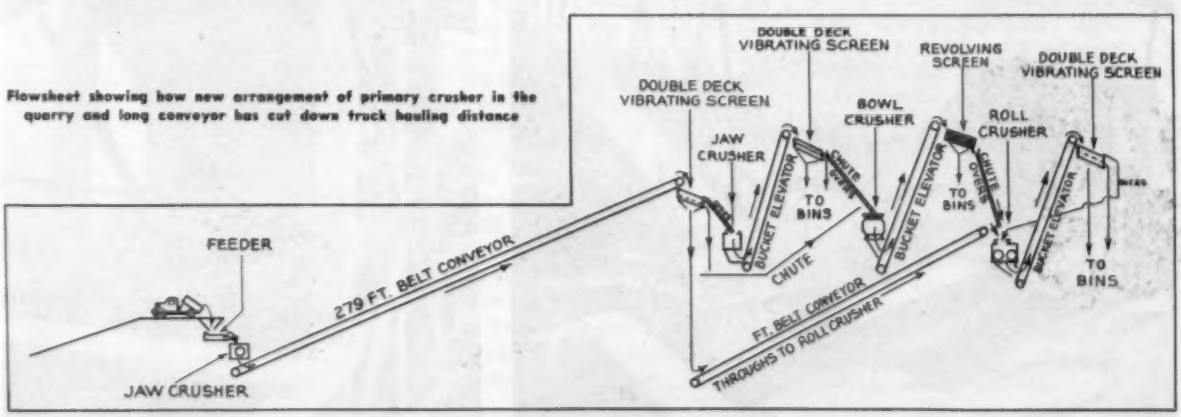
Sell Diatomite Company

KITTITAS DIATOMIC CO., Kittitas, Wash., has been sold to the Great Lakes Carbon Corporation, and will be operated by the Dicalite Division in Los Angeles, Calif. This division operates plants in Washington, Oregon, California and Nevada. More machinery will be added at the Kittitas plant to double production. John Sorenson is general superintendent of the plant.

Mammoth Tusk in Gravel

MIAMI GRAVEL CO., Huntington, W. Va., reported that one of its dragline operators uncovered a mammoth or mastodon tusk recently at its gravel plant near Chillicothe, Ohio. The tusk was imbedded in the gravel 16 ft. below the surface.

Flowsheet showing how new arrangement of primary crusher in the quarry and long conveyor has cut down truck hauling distance



Meet Tough Specification by Adding 50-Mesh Sand

Becker County Sand and Gravel Company, Cheraw, S. C., blends fines with coarser product by regulated feed to conveyor belt

Showing 10-hp. motor, speed reducer and chain drive to off-center shaft which operates feeder

SAND SPECIFICATIONS of the South Carolina Highway Department, which require from 8 to 30 percent passing 50-mesh, have presented a problem to producers whose deposits do not contain this amount of fines.

Becker County Sand and Gravel Co., Cheraw, S. C., has solved it by blending a fine sand with the product obtained through normal operations. About four miles from the plant there is a vein of sand which appears on the surface. This vein averages about 3 to 4 ft. in thickness, and has no overburden except scrub grass which is scraped off preliminary to reclamation of the sand. Analysis shows that about 50 percent of the deposit passes 50-mesh.

The sand deposit is found on the properties of neighboring farmers from whom it is purchased on a royalty basis. Loaded to trucks by a power shovel, it is hauled to the plant and stockpiled.

Normal washing and screening operations produce a sand, 7 percent of which passes 50-mesh. This sand is stored in bins above a recovery tunnel, preliminary to blending and delivery to a loading tipple. It is reclaimed from bins on a 36-in. Link-Belt conveyor, 150-ft. centers, which transfers material to another 36-in. Link-Belt conveyor, 150-ft. centers, set at right angles to the first belt.

Installed above, and near the feed end of the second conveyor, is a 9-ton capacity steel hopper which is filled with fines from the stockpiles. The hopper is equipped with a 5-ft. x 18-in. feeder, operating from an off-center shaft through a Link-Belt, chain-driven, speed reducer. Power is provided by a 10-hp. G.E. motor. An accompanying illustration shows the hopper and feeding arrangement.

It has been found that an addition of 20 percent of fines will result in a product having 10 to 12 percent passing 50-mesh. The feeder is set to load the belt at the proper rate of speed to produce the desired blend. Blended sand is sent to either cars or trucks at the loading tipple.

This arrangement has enabled the production of sand which will meet State highway specifications for concrete.

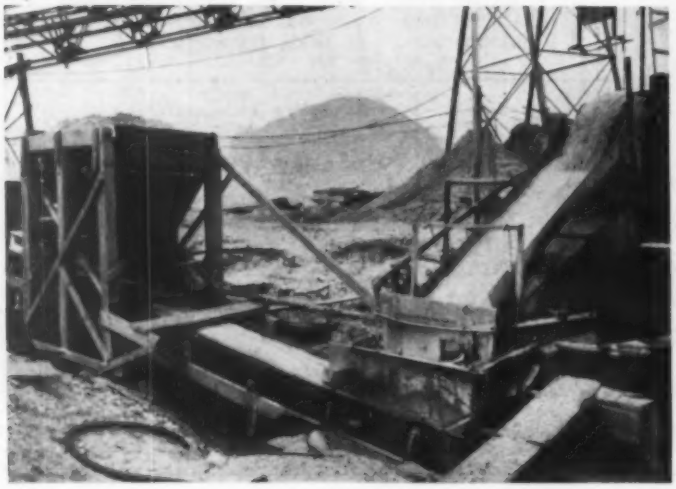
E. W. Hallett is president of the Becker County Sand and Gravel Co.; E. A. Mullen is general manager; and Wm. Hasskamp, who designed the blending arrangement, is superintendent.

Abandon Quarry Storage?

SECRETARY OF AGRICULTURE Clinton P. Anderson is studying the proposal to abandon the cold storage plant built in the limestone mine of Geo. Kerford Co., Atchison, Kans. The government has invested $2,000,000 in the plant, and is reluctant to abandon the project if some peacetime use can be made of it.

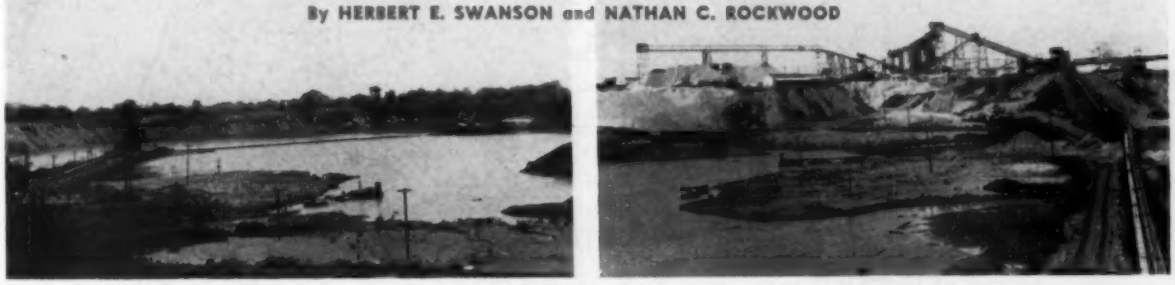
Right: Bin contains fines which are discharged by feeder to conveyor belt, below

Below: Sand at upper right discharging over chute to belt conveyor which operates under bin, to the left, blending fines into coarse sand. When gravel is conveyed to the loading tipple the chute is removed and gravel goes through screen under chute before being sent to belt conveyor



OPERATING TRENDS
in the ROCK PRODUCTS Industry

By HERBERT E. SWANSON and NATHAN C. ROCKWOOD



McGrath plant at Chillicothe, Ill., with chain-bucket dewatering plant for dredged material and long belt conveyors to processing machinery

Construction Material Surveys

ILLINOIS IS ONE of the nation's most favored states. It is in the heart of the prairie corn belt, which means its natural soils are rich and lasting; it has inexhaustible deposits of limestones; its deposits of sand and gravel, being primarily of glacial origin, are of the highest quality found in the United States. Illinois has immense deposits of bituminous coal; considerable petroleum resources; some of the purest silica in the United States, fluorspar, zinc, lead, tripoli and other minerals.

Consequently, Illinois is in the forefront for post-war public works construction. The problems of the producers of materials that must enter into these construction projects will be better understood if we review briefly the geological history of the state and the kind and character of the natural materials the producers have to work on. However, very few of these problems are peculiar to Illinois, or even to bordering prairie states; producers in all parts of the country will find something of interest and value to the solution of their own problems.

Geology of Illinois

From late Cambrian times, many millions of years past, when the oldest rocks now exposed in Illinois were formed, on to the present, seas at one time or another covered all or parts of what is now the State of Illinois. In those seas in which geological conditions remained relatively constant for a long time were deposited the various limestone formations of the State. These are chiefly dolomites, including high purity dolomite, outcropping in the northern part of the State and calcium limestones, including high calcium limestones, exposed in western and southern Illinois. Best known formations are the Niagaran dolomite at Chicago, Kankakee and Joliet, the Burlington limestone at Quincy and the Ste. Genevieve, St. Louis and Salem formations in western and southern Illinois. Crushed stone for aggregate, ballast and agricultural limestone is produced from all these formations and others as well but the Niagaran formation supplies a greater tonnage of stone than any other single formation.

On the shores, beaches and bars of other ancient seas of long duration sandstones were formed of which the St. Peter formation is outstanding because it is the source of the unusually pure silica sands of the widely known Ottawa district.

Other rock products related to these older geological formations are the portland cement made at Dixon from the Platteville formation and at LaSalle from a younger limestone of Coal Measures or Pennsylvanian age. Likewise lime and sintered dolomite are made from the high purity Niagaran dolomite of the Chicago area, which also is the source of refractory dolomite; at Kankakee, Joliet and Chicago the Niagaran formation supplies building stone of various kinds; and high calcium chemical limes are

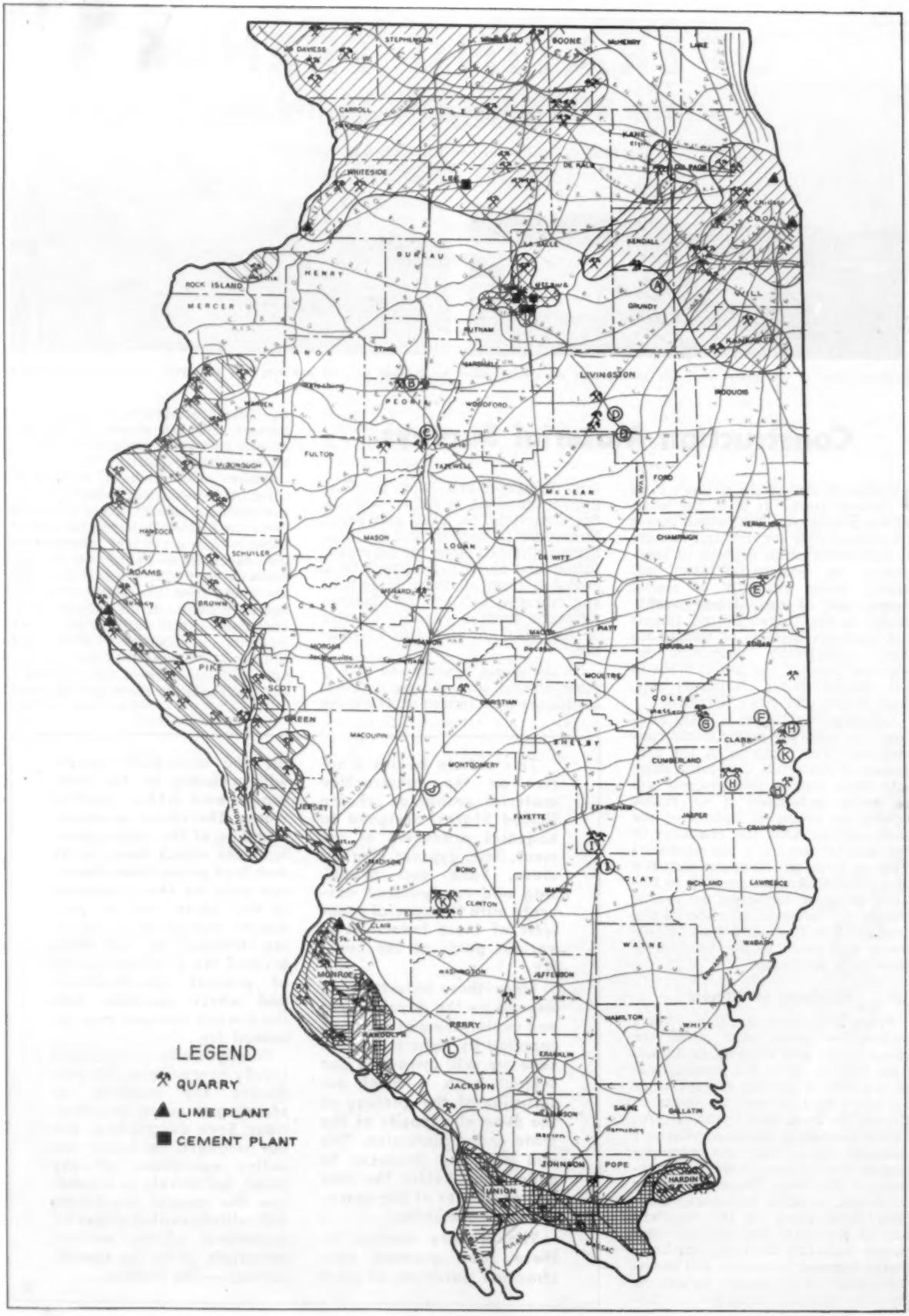
(Continued on page 82)

This article begins a series on the construction material resources of the United States, designed to acquaint producers of cement, lime, gypsum, crushed stone, sand and gravel, slag and ready-mixed concrete with the special problems of these industries in various parts of the country.

Since these industries all depend on the development and exploitation of minerals supplied by nature, in each case we will introduce our subject with a brief description of the geology of the mineral deposits of the state under discussion. This will help the producer to understand better the kind and character of the operations in each state.

The primary market for these rock product construction materials, at least for the immediate future, will probably be for highways and other public works. Therefore, an understanding of the state specifications which have to be met is of prime importance, not only to the producers in this state, but to producers elsewhere as showing trends. So, we have briefed the principal points of present specifications, and where possible, outlined what changes may be looked for.

Finally, we have described briefly how progressive producers are meeting, or planning to meet, specifications. Such descriptions are not intended to cover the entire operations of any plant, but merely to emphasize the special processing difficulties created either by limitations of the natural materials, or by the specifications.—The Editors.


LEGEND
QUARRY
LIME PLANT
CEMENT PLANT
JO DAVIESS
STEPHENSON
WINNEBAGO
BOONE
MCHENRY
LAKE
CARROLL
OGLE
KANE
DU PAGE
WHITESIDE
LEE
DE KALB
COOK
BUREAU
LA SALLE
KENDALL
HENRY
ROCK ISLAND
MERCER
PUTNAM
GRUNDY
WILL
KANKAKEE
LIVINGSTON
KNOX
STARK
MARSHALL
IROQUOIS
PEORIA
WOODFORD
MARTEN
TAZEWELL
FULTON
MCDONOUGH
FORD
MCLEAN
HANCOCK
MASON
LOGAN
CHAMPAIGN
VERMILION
SCHUYLER
DE WITT
ADAMS
BROWN
CASS
WARD
PIATT
MACON
DOUGLAS
EDGAR
PIKE
MORGAN
SCOTT
MOULTRIE
COLES
CHRISTIAN
GREEN
MACOUPIN
SHELBY
CLARK
CUMBERLAND
MONTGOMERY
CALHOUN
JERSEY
FAYETTE
JASPER
CRAWFORD
MADISON
BOND
CLAY
RICHLAND
LAWRENCE
CLINTON
ST. CLAIR
WAYNE
WABASH
MONROE
WASHINGTON
JEFFERSON
EDWARDS
RANDOLPH
PERRY
HAMILTON
WHITE
FRANKLIN
JACKSON
WILLIAMSON
SALINE
GALLATIN
JOHNSON
POPE
HARDIN
UNION
ALEXANDER
MASSAC

Elasticity of operation is provided so that 28 sizes of stone are stocked and shipped

STONE Deposits of Illinois

THE STATE GEOLOGICAL SURVEY, under Dr. M. M. Leighton, chief, has long studied and investigated the limestones and dolomites of Illinois. The survey stands ready to assist any producer to acquire a more intimate acquaintance with the rock he owns or is quarrying. The Division of Highways of the Department of Public Works and Buildings also examines deposits and tests them for use in the production of aggregates. Because of the great current demand for agricultural limestone, the Geological Survey has made a careful search for all available sources, but many of these have been developed with portable pulverizers only and are not potential sources of aggregates.

Bulletin 46 of the Geological Survey, "Limestone Resources of Illinois," was prepared in the early 1920's when the state first embarked on its extensive concrete highway construction program. It is very complete and gives a county by county description of all known limestone and dolomite deposits. This report also gives the results of physical tests —specific gravity, weight per cubic foot, percent of wear, French coefficient, coefficients of hardness and toughness and cementing value (for macadam type roads). Those were the standard tests of the U. S. Bureau of Public Roads at that time and can be related to present tests, such as the Los Angeles rattler test for loss in abrasion.

MAP LEGEND

Thick dolomite formations, some of them cherty. Much of the dolomite contains more than 90% carbonates and in parts of Whiteside, Carroll, Cook and Kankakee counties occur high purity dolomites low in silica and iron.

Thick limestone formations. Most of the limestones contain over 90% carbonates and many of them are high calcium stone.

Thick limestone formations, mostly cherty, but with beds of chert free high calcium limestone as much as 25 ft. thick especially in the vicinity of Quincy. North of Adams County the limestones in general are somewhat less thick than in the area to the south and may contain interbedded shale. Dolomite and dolomitic limestones are present.

Limestone formations, mostly over 60 ft. thick, interbedded with shales or sandstone formations of similar thickness. Many of the limestones contain over 90% carbonates.

Limestone formations rarely more than 60 ft. thick, interbedded with shale and sandstone formations. Some of the limestones contain over 90% carbonates.

Dolomite rarely over 60 ft. thick but of good purity, and, at La Salle and in the area to the south limestone used for Portland cement manufacture.

Chert and cherty limestone.

A, B, C,—areas where limestone deposits are generally less than 15 ft. thick and mostly of Coal Measures age.

Geological Column

Starting with the most recent and working back into the earlier geologic periods, the strata of Illinois are described as follows: *Pleistocene* and recent deposits: Deposits of this age, including glacial till, sand, gravel, silt (loess) and alluvium, are known in all parts of the state though till is absent in a small area in the northwest corner of Illinois, in part of Calhoun County, and in the extreme south part of Illinois. These deposits vary between 0 and 650 ft. thick though a thickness of more than 200 ft. is rare. *Pliocene* and *Eocene:* Unconsolidated clay, sand, gravel and lignitic material, 400 ft. or more thick, found only in the extreme southern part of the state. *Cretaceous:* Unconsolidated sands and clays, 200 ft. or more thick, found chiefly south of the Cache River in the southern end of the state.

Limestone deposits begin with the Pennsylvanian period when shales, sandstones, limestones and coals were formed which have a maximum thickness of 2400 feet and cover most of the State except for the northern end and a narrow belt along the west and south margins. Most of the Pennsylvanian limestones are less than 15 feet thick but a few reach 25 feet or more. *Mississippian* limestones of nine principal formations are found chiefly in the southern and western parts of the state. Some of these, like the Salem, St. Louis and Ste. Genevieve formations contain high calcium stone. The bluffs along the Mississippi River near Alton and southeast of St. Louis are of the St. Louis formation, extensively quarried in the city of St. Louis, Mo. Parts of these formations contain chert or shale strata. The thickness of the various Mississippian formations varies from 0 to 2000 ft.

The Devonian limestones occur in

two limited areas in Illinois, one near Rock Island where the limestone vary from high calcium to impure and are dolomitic in some places, and the other in southern Illinois where they vary from high calcium to very siliceous and cherty. In northern Illinois the maximum thickness of the limestone is 140 ft.; in southern Illinois the total thickness of limestone of such character that it is likely to find use as a construction material is about 550 ft. Devonian limestones are nowhere more than about 400 ft. thick. The massive dolomite which makes up the bed rock of northeastern and northwestern Illinois is of the *Silurian* system, Niagaran series, and is up to 450 ft. thick. Smaller deposits of purer limestone occur in both northern and southern outcrops. Older limestones of the *Ordovician* system, with shale and sandstones, crop out mainly in the central and western parts of northern Illinois. The only southern limestones of this system are in Calhoun, Monroe and Alexander counties and are very pure high calcium limestones.

In addition to Bulletin 46, referred to above, the Geological Survey has issued several others. Bulletin 61 on "Rock Wool Resources" describes many of the less pure limestones and dolomites of the state, and gives chemical analyses of such rocks as well as of typical Illinois limestones and dolomites. Report of Investigations, No. 49, discusses the various uses of limestone and dolomite, and the physical and chemical requirements which the rock must meet for the various uses. Report of Investigations, No. 90, gives extensive information on the high-purity dolomites

Construction Materials

(Continued from page 79)

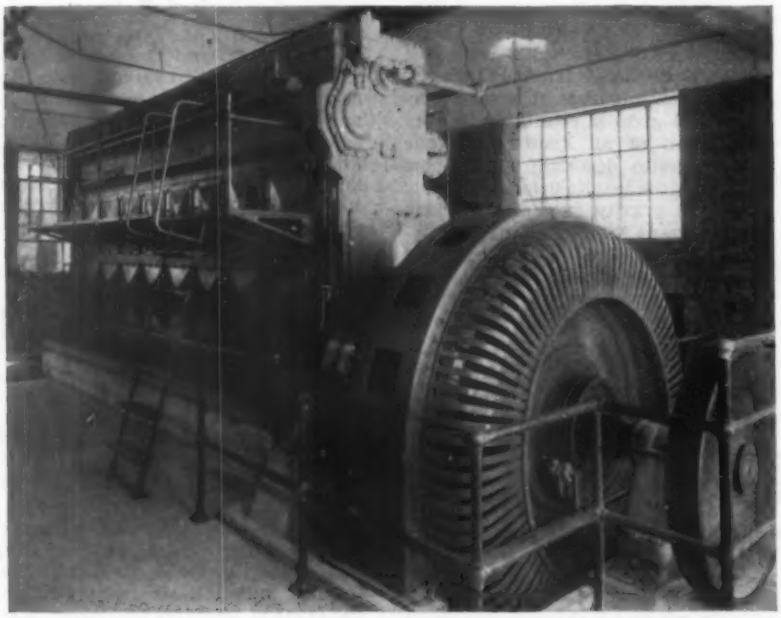
made from the limestone deposits along Mississippi River in the western and southwestern part of the State. High calcium lime is also made in South Chicago from imported Michigan stone.

No gypsum is mined or quarried in the state of Illinois although deep laid deposits are known to exist. However, gypsum is brought in from nearby Michigan deposits and manufactured into building products in the northeast corner of the state.

Long after the marine life of the inland seas had made deposits of dolomite and limestone, the various glacial periods came, and at times all except two small parts of Illinois were covered by great layers of ice that crept down from the Canadian shield, which contained some of the earth's oldest surface rocks. The drift left by the glaciers as they melted and retreated, gave rise, directly or indirectly, to the state's unsurpassed sand and gravel deposits occurring in outwash, plains, valley trains, Eskers and Kames.

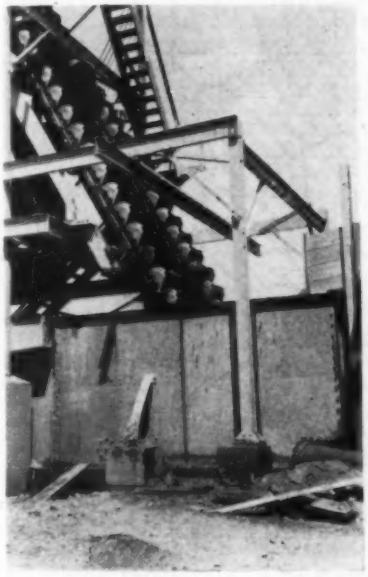
The most evident glacial deposits are in the northern part of the state where the topography is a little more rugged. The state as a whole is a gently sloping plain from north to south, and the sand and gravel deposits of the central and southern part, while originally the product of the glaciers, were placed in their present localities by rivers and streams formed by the melting ice. In general those streams are marked by present water courses, but of course the original streams were much larger and many deposits now lie well above the recent flood plains.

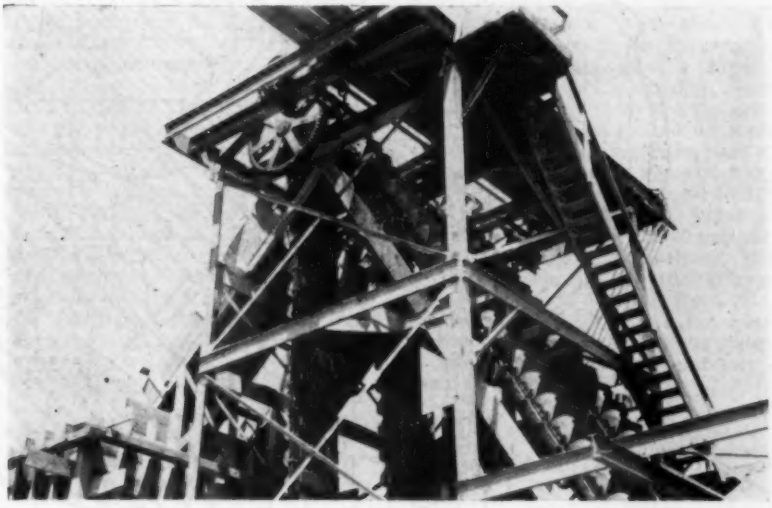
The direct deposits of glaciers are for the most part composed of silty clay containing sand, pebbles, cobbles and boulders and therefore not important as sources of structural materials. However, the sorting action of running water, in this case especially the melt waters from the glaciers, on such material and on the load of rock materials carried within the ice of the melting glaciers, makes a rough size classification of the component rock fragments and gives rise to stratified fluvial deposits whose over all particle size characteristics are in the main determined by the distance the material has been transported from its source. Thus deposits close to a glacier are apt to be largely gravel, cobbles and boulders and those at a considerable distance clay, silt and sand. This phenomenon is evident in the fluvial deposits of glacial materials in Illinois, some being so coarse that a large percent of the material requires crushing to bring it within the size specifications for construction materials whereas other deposits contain an excess of sand above market requirements.



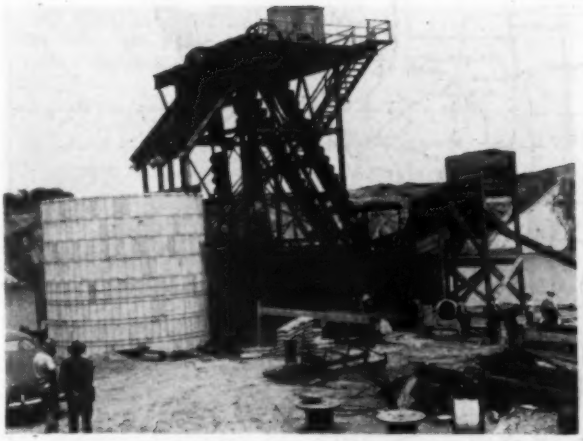
Columbia Quarry Co. has provided for cheaper electric power by making its own with Diesel-electric generators, above; and for modern quarry haulage with 17-ton semi-trailer trucks

McGrath Sand and Gravel Co., Pekin, Ill., plant, pushes material from bank to dredge to help solve the pit transportation problem

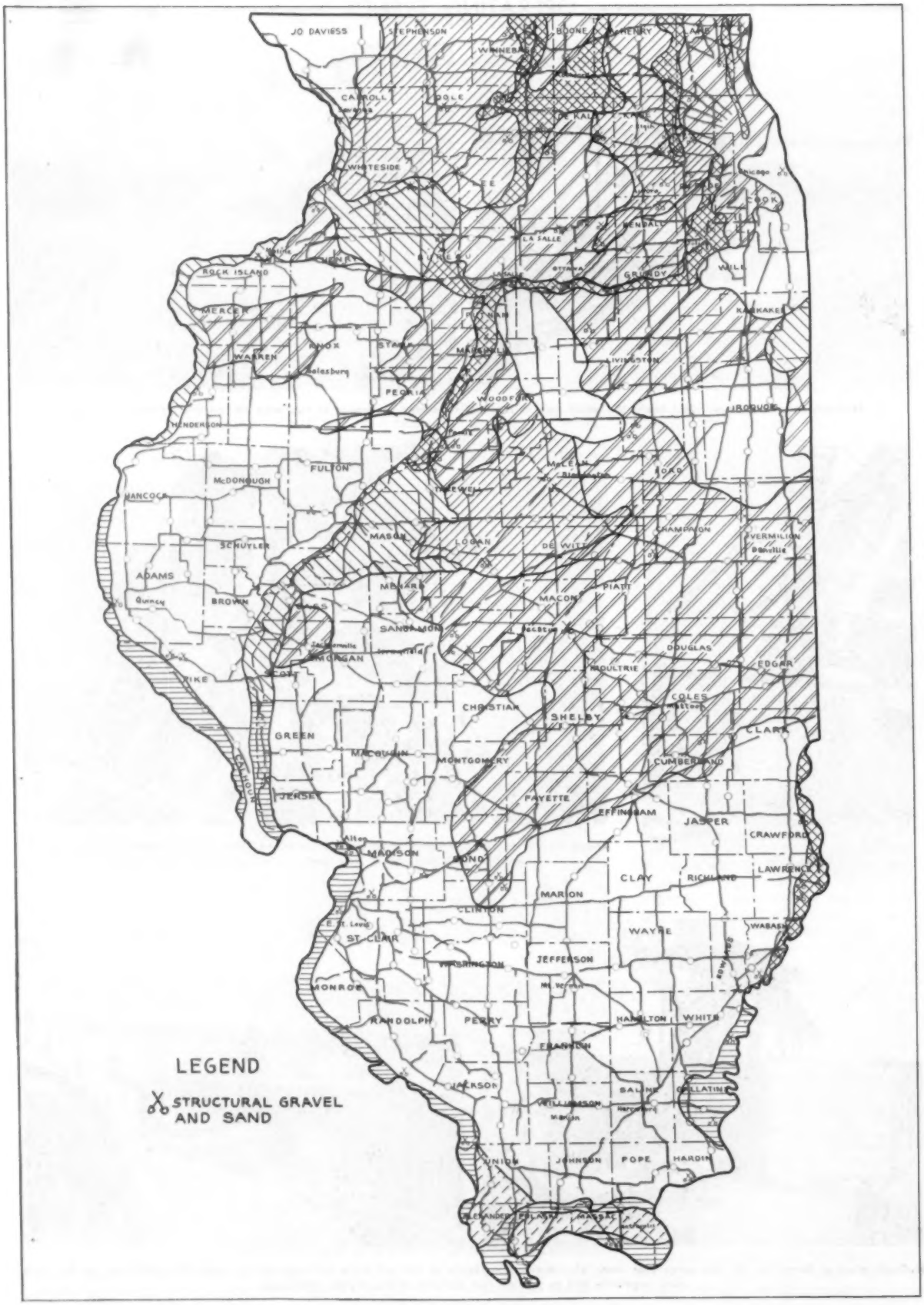




Above, and to the left: McGrath plant at Chillicothe, Ill., uses dredge bucket elevator for dewatering sand and gravel. This method is now standard at all plants



McGrath plant at Forreston, Ill., has surge tank made of concrete silo staves so that out-going belt conveyor to processing plant may be fed with more regularity and to provide raw material during dredge stoppages


JO DAVIESS
STEPHENSON
WINNEBAGO
BOONE
MCHENRY
LAKE
CARROLL
OGLE
DE KALB
WHITESIDE
LEE
COOK
KENDALL
LA SALLE
ROCK ISLAND
GRUNDY
WILL
MERCER
KANKAKEE
KNOX
WARREN
Galesburg
STARK
PEORIA
WOODFORD
LIVINGSTON
IROQUOIS
HENDERSON
FULTON
McDONOUGH
FORD
HANCOCK
CHAMPAIGN
VERMILION
SCHUYLER
MASON
LOGAN
DE WITT
ADAMS
MENARD
PIATT
BROWN
Quincy
MACON
SANGAMON
DOUGLAS
EDGAR
MORGAN
PIKE
SCOTT
MOULTRIE
COLES
CHRISTIAN
SHELBY
CLARK
GREEN
MACOUPIN
MONTGOMERY
CUMBERLAND
CALHOUN
JERSEY
PAYETTE
EFFINGHAM
JASPER
CRAWFORD
Alton
MADISON
BOND
CLAY
RICHLAND
LAWRENCE
MARION
CLINTON
WAYNE
E. St. Louis
ST. CLAIR
WABASH
JEFFERSON
WASHINGTON
MONROE
RANDOLPH
PERRY
HAMILTON
WHITE
FRANKLIN
JACKSON
SALINE
GALLATIN
WILLIAMSON
UNION
JOHNSON
POPE
HARDIN
ALEXANDER
PULASKI
MASSAC
LEGEND
STRUCTURAL GRAVEL AND SAND

SAND and GRAVEL in Illinois

Ambraw Gravel Co., Lawrenceville, Ill., also has a simple dredging operation, but has two sand boxes under launder, one to recover concrete sand, the other mason sand; 6 to 8 percent minus 50-mesh and 0 to 2 percent minus 100-mesh recovered

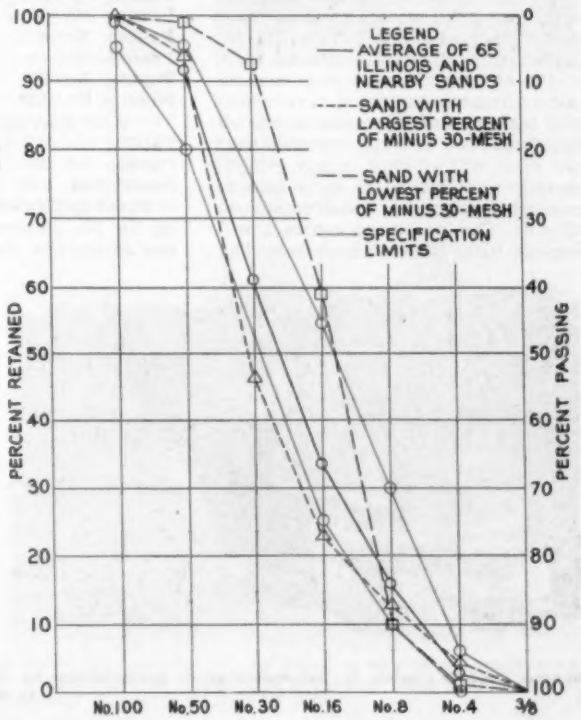
AS YET the State Geological Survey has prepared no comprehensive report on the sand and gravel resources of Illinois, but maps for many counties have been prepared for the State Division of Highways, and the information is available to interested parties. The map on the opposite page gives a summary of the data. From other sources we have acquired sufficient information to make the following summary of the quality or character of materials available in various parts of the state, based, however, in most instances on small samples, which may not be any too representative. At least they give a general picture of how the material varies from north to south in the state.

Characteristics of Sand and Gravel

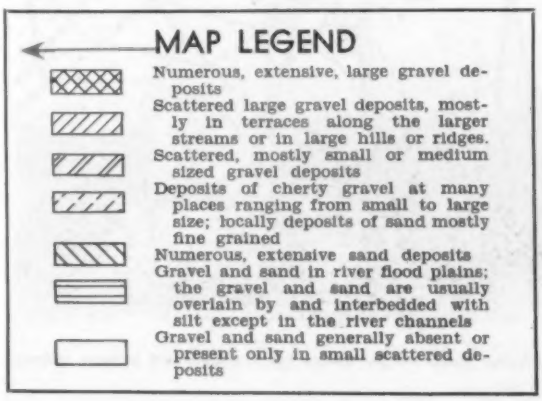
Taking the tier of counties west and north of Chicago, those in the northwest have gravels composed largely of siliceous materials such as granite and schist, with considerable percentages of quartz. As one goes south, especially in the vicinity of Chicago, a higher percentage of limestone and dolomite pebbles are found, and smaller percentages of quartz. These northern gravels are similar to the southern Wisconsin gravels which compete with them, and are among the best in the United States. In the rest of the state the sands and gravels are described as mixed silicious materials and limestone, with the percentage of quartz or silica increasing in the river valley deposits on the borders of the state. There is in some of the deposits in the southern two-thirds of the state occasional contamination with shale and "chocolate bars," but not sufficient to require picking by hand. Log washers usually take care of these.

The sand from these Illinois deposits is uniformly good although in many instances containing more "soft" material, including limestone, than many deposits elsewhere. They are by no means all quartz sands. The chief impurities, found only in scattered deposits, are shale, ochre, coal and limonite. Limestone is not considered objectionable; on the contrary it is welcomed as evidence of fine material of sound character. Chert is not common in the sands of the state, ranging from about 0.2 percent to as much as 10 percent, but on the average about 3 percent.

The specific gravity of these sands (oven dry) ranges from 2.59 for some Ohio River material to 2.60 for some of the sands in the northern part of the state. Weights per cubic ft. vary from 108 for Ohio River sand to 117 for northern Illinois sand. Voids in the sands vary from 30 to 39 percent, with an average of 32.4 percent. The chart, herewith, shows the average sieve analyses of 65 sands from various parts of Illinois and a few competitive sands from neighboring states, together with the two extremes—coarse and fine.



Right: Average Illinois sand compared with two typical sands


MAP LEGEND
Numerous, extensive, large gravel deposits
Scattered large gravel deposits, mostly in terraces along the larger streams or in large hills or ridges.
Scattered, mostly small or medium sized gravel deposits
Deposits of cherty gravel at many places ranging from small to large size; locally deposits of sand mostly fine grained
Numerous, extensive sand deposits
Gravel and sand in river flood plains; the gravel and sand are usually overlain by and interbedded with silt except in the river channels
Gravel and sand generally absent or present only in small scattered deposits

Materials Specifications for Highways

THE PRIMARY SYSTEM of state highways in Illinois, according to Walter A. Rosenfield, director of Public Works and Buildings, comprises about 12,000 miles, largely portland cement concrete; a large part of this mileage was built in the 1920's and on through routes, which have since become main interstate trucking traffic lines. Even before 1940 it was evident that many miles of these were obsolete in widths, alignments and grades, as well as badly deteriorated by heavy traffic. Many of them would have been replaced by now except for the war. The new portland cement concrete pavements will be wider, thicker, and in many instances have granular sub-bases.

For other worn-out concrete pavements, not on trunk-line routes, a bituminous resurfacing program is in progress, which consists in placing 2 to 3 in. of hot-mixed bituminous material directly on the old concrete. The usual practice in this case is first to strengthen or repair any serious breaks and widen the pavement to 22 ft., where traffic conditions demand it. On this base 1½ in. of binder course and 1½ in. of wearing course bituminous mix is applied. While adopted as a war measure to keep some of the highways in service, it will likely have a considerable place in the post-war reconstruction program.

Cement

The Illinois State Highway Division's specifications for portland cement are A.S.T.M. designation C-150 for Type I and C-150 Type III for high early strength cement, and C-175-44T for air-entraining cement. Air entraining cement is now specified for concrete pavements within all municipalities. It is not expected that the state will attempt to buy cement directly as it did in the early days of concrete pavement construction in Illinois. The pavement contract will include furnishing all materials. The slabs will be reinforced with steel bars as has been the practice.

There is provision in the pavement specifications for using ready-mixed concrete delivered in either truck drum-type or open-trough type mixers and agitators. A time limit of 30 min. is placed on the mixing after the water is added, but where the haul is more than 30 min., the water may be added at the site of the job or added from a tank on the truck 30 min. or less before delivery. The ready-mixed concrete must conform to the same specifications as the concrete mixed by a paving mixer on the job—it must have a slump of not less than 1 in. nor more than 2 in., which certainly is a severe handicap for ready-mixed concrete manufacturers under present conditions.

Aggregates

Fine aggregate must all pass a ⅜-in. mesh, must not contain more than 3 percent passing No. 200 mesh, not contain more than 1 percent each of (1) coal, lignite, and shells; (2) clay lumps; (3) conglomerate and cemented particles. The combined amount of these deleterious particles must not exceed 4 percent by weight. Fine aggregate must not lose more than 10 percent by weight in 5 cycles of the sodium sulphate test, or, alternately, in 50 cycles of the freezing and thawing test. The present specification covering sand gradation is as follows:

Fine Aggregate for Concrete

Passing ⅜-in.	100 percent
Passing No. 4	95-100 percent
Passing No. 8	70-90 percent
Passing No. 16	45-75 percent
Passing No. 50	5-20 percent
Passing No. 100	0- 5 percent

Fine Aggregate for Mortar

Passing No. 8	100 percent
Passing No. 50	15-40 percent
Passing No. 100	0-10 percent

These specifications have no limits on the No. 30 sieve, but with one or two exceptions, the Illinois sands do not appear to have a "belly" in the vicinity of this size (see chart on previous page). However, nearly all the processed sands are lacking in desirable percentages of minus 50-mesh sizes, such as are now required in Federal, American Association of State Highway Officials' and A.S.T.M. specifications. All these specifications provide for 10 to 30 percent passing No. 50 and 2 to 10 percent passing No. 100. The Illinois highway engineers would like to conform but producers have asked for time to revamp their operations. The present specification limits are shown in color on the chart on the preceding page. Stone sand may be used if it conforms to the natural sand specification. Stone sand for bridge concrete may have up to 80 percent passing a No. 16 and must have from 10 to 30 percent passing No. 50; 0 to 10 percent passing No. 100.

Coarse aggregates may be gravel, crushed gravel, crushed stone or crushed slag; must not contain more than 5 percent by weight "soft and unsound" fragments, which includes chert in the case of crushed stone. In the case of gravel, all varieties of flint are classified as chert, and the total must not exceed 25 percent. The percentage of wear by the A.S.T.M. Los Angeles rattler test must not exceed 32 percent. Soundness loss must not exceed 15 percent in 5 cycles of the sodium sulphate test, or, alternately, 50 cycles of freezing and thawing. There are for specifications for sieve analyses as follows:

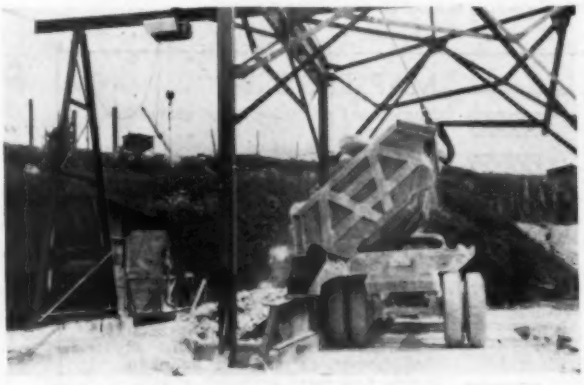
(1) *Size A (Concrete Pavement and Base Course)*

Passing 2½-in.	100 percent
Passing 2-in.	90-100 percent
Passing 1½-in.	35-70 percent
Passing 1-in.	0-15 percent
Passing ½-in.	0-5 percent

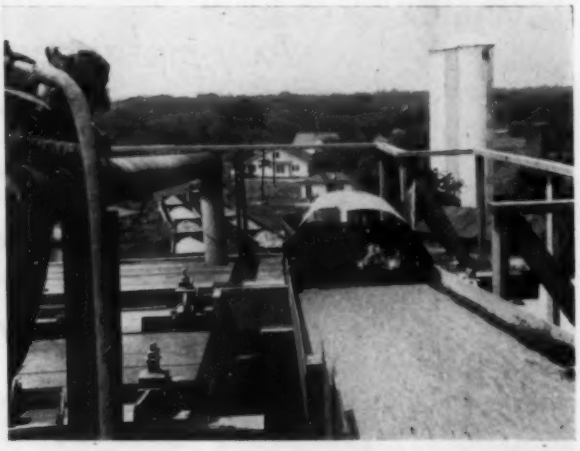
(2) *Size B (Concrete Pavement and Base Course)*

Passing 1½-in.	100 percent
Passing 1-in.	90-100 percent
Passing ½-in.	25-60 percent
Passing No. 4	0-10 percent

While the separated sizes of coarse aggregate for concrete pavements are included in the standard specifica-



National Stone Co., Joliet, Ill., has modernized its quarry haulage by using semi-trailer trucks on the quarry floor, and the old inclined railway to the plant



Above, and to the right: Conkey Sand and Gravel Co., North Aurora, Ill., by changing the method of feeding automatic valve operated Dull cones the company was able to recover fines for both mason's and concrete sand. There are three cones in a row under each launder. The first cone in each row is fed through a 12-in. diameter opening in the bottom of the flume, covered over with a 1-in. by 16-in. slotted screen. The overflow of the first cone is divided equally between the two following, by means of baffles. Up to 12 percent passing the 100-mesh is recovered in the first cone (mortar sand) and 8 percent in the two following cones (on each side)

tions, their use was waived during the war, and so far, since then, have not been insisted upon.

(3) *Size X (Concrete for Structures)*

Passing 1½-in.	100 percent
Passing 1-in.	60-95 percent
Passing ½-in.	10-30 percent
Passing No. 4	0-5 percent

(4) *Class A (Concrete for Structures)*

Passing 2½-in.	100 percent
Passing 2-in.	95-100 percent
Passing 1-in.	35-70 percent
Passing ½-in.	10-30 percent
Passing No. 4	0-5 percent

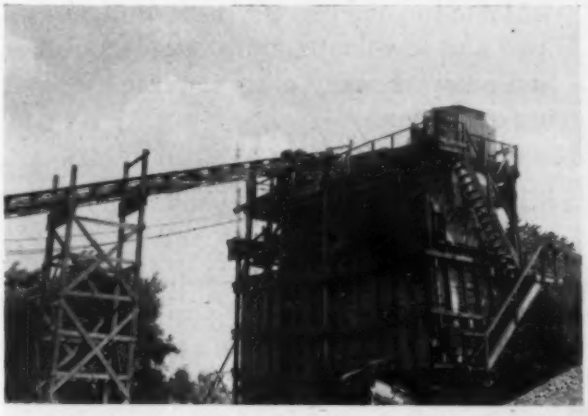
Requirements for gravel coarse aggregate for bituminous pavements vary with the type of surface. In the case of class A and B bituminous surfaces, the gravel may be crushed or uncrushed; in Class C surfaces, gravel must contain at least 50 percent crushed particles; and in Class D, H, I and J surfaces, the gravel must be 100 percent crushed particles. Under the specifications, crushed gravel is defined as the material resulting from crushing particles which are retained on a screen with openings one-and-one-half times as large as the maximum size permitted by the gradation requirements.

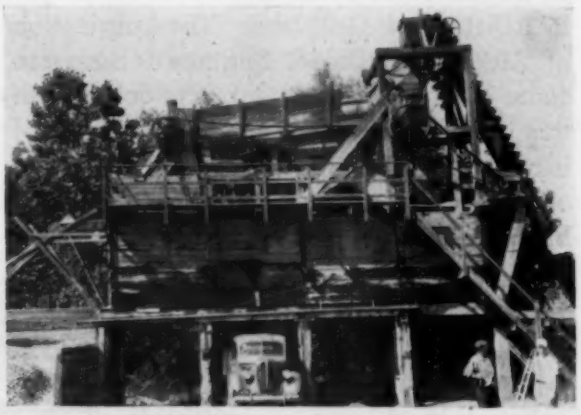
Granular Sub-Bases

A considerable mileage of pavement to be constructed or reconstructed in Illinois will require special subgrade treatment. The need for this has been recognized by the state highway engineers for several years, and a considerable mileage has been laid on prepared subgrades. The Illinois practice favors a compact stabilized subgrade that will resist entrance of surface water, rather than a loose granular subgrade for sub-surface drainage purposes. Crushed stone or gravel conforming to the following size specification may be used; in most instances the material desired is pit-run gravel:

Passing 3-in. ..... 100 percent
Passing No. 4—Not less than 50 percent nor more than 65 percent
Passing No. 50—Not more than 20 percent

(Continued on page 90)

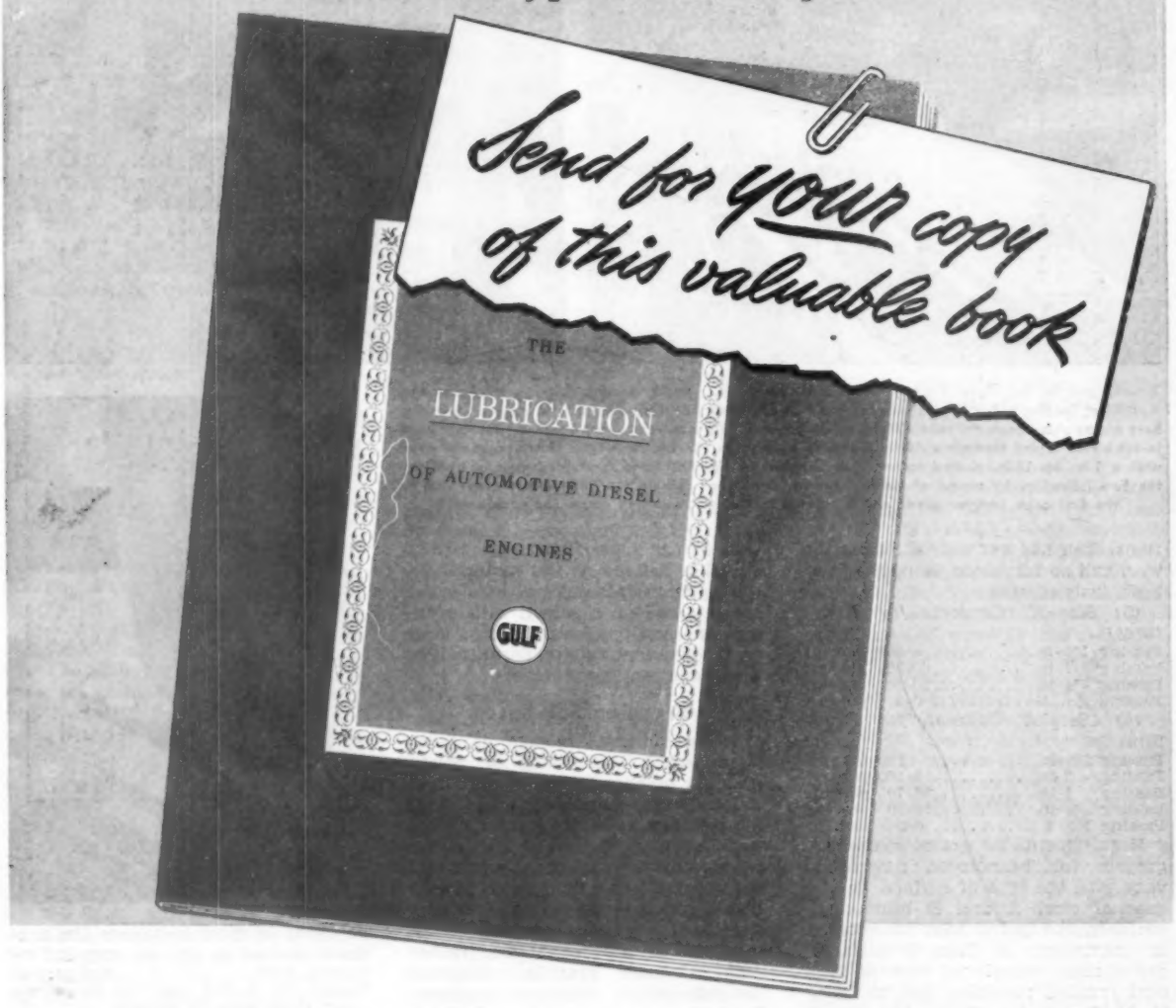




Left, Risley Sand and Gravel Co., Dixon, Ill., and right, Sycamore Sand and Gravel Co., Sycamore, Ill., are typical small sand and gravel operations in northern part of state. Material brought to plants is comparatively dry and cylindrical screens with tilting sand tanks, below, constitute the principal equipment

Memo to operators of

Automotive-type Diesel engines:



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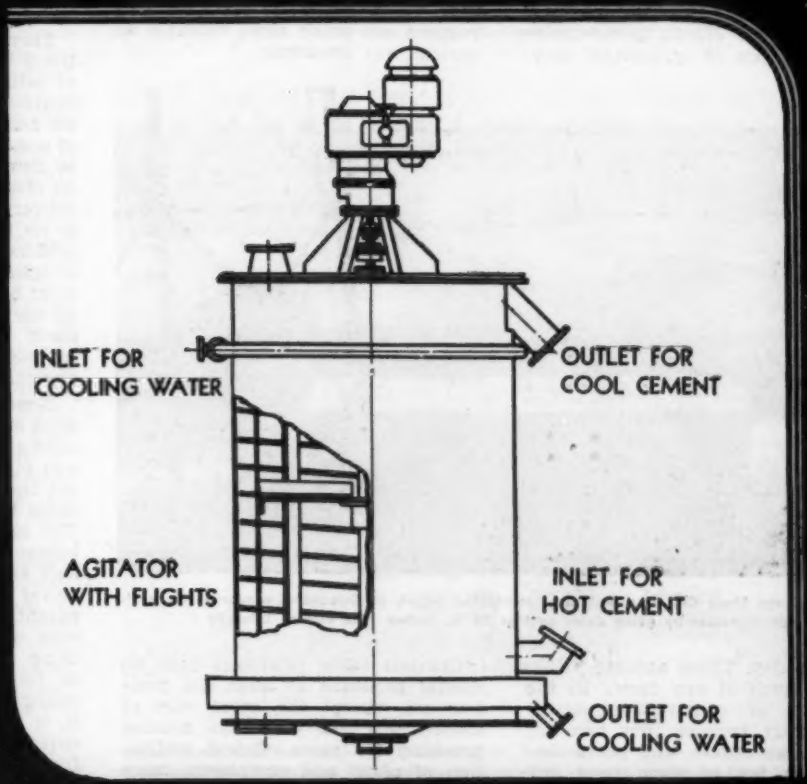
FOR COOLING HOT CEMENT



Cement manufacturers are frequently confronted with the problem of cooling hot cement to temperatures acceptable when making bulk shipments or for immediate packing in paper bags. The FLS Cement Cooler was especially developed for cooling hot cement. • The FLS Cooler consists of a tank, water-cooled externally, the cement being introduced into the bottom and conveyed in a thin layer along the inside of the water-cooled wall to the top, where it is discharged. Thus an intimate contact is established between the cement and the water-cooled surface, assuring high-cooling efficiency. • In addition to cement, the Cooler is applicable to many other similar dry pulverized materials.

F. L. SMIDTH & CO.

Designers of Cement Making Factories, Manufacturers of Machinery for Making Cement and Lime, etc.

11 WEST 42nd STREET NEW YORK, N. Y.

Total clay and silt—Not more than 10 percent

This granular subgrade material is placed in uniform layers, not exceeding 6 in. each, and rolled. The actual depth or thickness of the granular materials varies with the subgrade conditions, but is never less than 6 in. in compacted thickness.

On one section of Route 66 between Chicago and St. Louis, now under construction, the old concrete slabs are being put through a portable crushing plant and this material will be used for subgrade preparation.

Examples of Aggregates Operations

CRUSHED-STONE quarry operations in Illinois vary from very large plants in the Chicago Metropolitan area, capable of producing 6000 tons or more per day, to numerous small plants engaged chiefly in producing 100 to 150 tons of agricultural limestone per day. These agstone plants are not much of any factor in the production of construction aggregates, partly because they can not handle large orders, and partly because very few of them have any railway shipping facilities.

All of the quarries in the state are in limestone or dolomite strata, and, although crushed-stone sand is permitted in state highway construction under the same specifications as for natural sand, only one or two producers have attempted to make stone sand. The reason is that the screenings which would be used for this purpose are much more valuable as agricultural limestone.

Elmhurst-Chicago Stone Co., in a high class residential suburb of Chicago is preparing for post-war expansion by going down another 38 ft. rather than expand laterally

Crushed stone producers face no special problems to meet the post-war era, except the usual ones of modernizing quarry haulage, making provision for more efficient utilization of plant and equipment, more efficient utilization of labor, and possibly provision for a greater variety of sizes, if they are to handle commercial business other than highway construction.

The sand and gravel producers who furnish the bulk of the state's requirements for highway aggregates are all rail shippers and are also large producers of railway ballast. They have been in business at their present sites for a long time, and one of their problems is the constantly growing distance between the active part of the pit and the processing plant. Some of the older plants depending on hydraulic dredge pumps have moved the plant receiving hopper constantly nearer to the dredge pond, and substituted many hundreds of feet of belt conveyors for pump pipe lines.

There is no question of the relatively less cost and greater efficiency of belt conveyor transportation over hydraulic transportation, but to utilize belt conveyors a dredge delivery of some 20 percent or less solids must be dewatered. Buckets on wheels or on chains which dip into the dredge delivery hopper are used commonly to do this dewatering. The result is satisfactory so far as the dewatering is concerned, but the overflow from these hoppers carries away practically all the finer sizes of sand, which are likely to become very much needed in post-war specifications for fine aggregate.

Some 20 or more years ago the most emphasis on the preparation of sand and gravel aggregates in Illinois was placed on cleanliness. Producers got the habit of washing out everything but the coarsest sizes of sand. The same producers find it hard to believe that sand containing desirable amounts of minus 50-mesh and minus 100-mesh is not *too dirty*. Apparently there is plenty of the finer sizes of sand in most deposits now being worked, or the finer sizes can be found close by. However, plant changes will be necessary to recover it, or to prevent losing it. If it is recovered separately from the other fractions of the concrete sand, blending it back into the concrete sand is a tough problem.

Aside from recovery and blending of the finer mesh sizes, Illinois producers are very fortunate in having

Eastwood Sand and Gravel Works, Graysville, Ill., pumps gravel from Ohio River with 8-in. dredge and sand with separate 6-in. dredge. Sand meets state highway specifications without further processing

sands remarkably well graded. Very few show excessive amounts of intermediate sizes which often plague producers elsewhere. Sand recovery methods up to the present have consisted almost entirely in the use of tilting sand settlers or automatic valve-operated settlers, with the overflow of the first going to the second, below, and so on, there being very often three in a row. This arrangement means that about the same volume of water rushes all through the row, and very little classifying is done in any of the tanks. They catch the coarsest material and the finer sizes overflow all tanks. Experience has shown that if the tanks are fed separately with only a part of the total sand load to each, they operate much more efficiently if some fine sand is desired in the product.

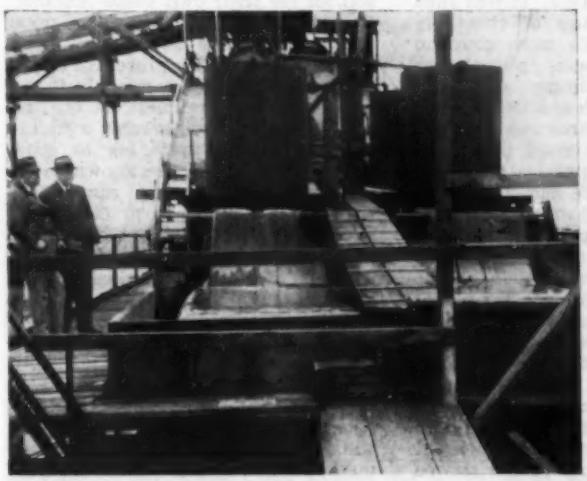
To recover adequate amounts of the finer mesh sizes of sand probably most producers in Illinois, at least those in the central and northern parts of the state, will have to install some kind of what the oldtimers call "dead boxes." Plants used to have them, but they were thrown out when the mania for *clean* sand was at its height. These are merely large settling tanks with extensive overflow weirs, so that the velocity of overflow will be so low that it will not carry away all the minus 50-mesh sizes. From observation, the present installations of tilting or valve-operated settling tanks and cones are wasting plenty of coarser sand than 50-mesh.

Both crushed-stone and gravel producers may require extra screens, storage and shipping facilities to make coarse aggregate in two sizes, for that appears to be the trend. Also, both have the problem of so-called soft particle elimination. At present, repeated handling and log washers are chiefly being depended upon in the case of gravel, and selective quarrying in the case of crushed stone.

E. C. Gaines Sand and Gravel Co., Elizabethtown, Ill., is a typical small river operation on the eastern and southern borders of Illinois

Vincennes Gravel Co., Lawrenceville, Ill., has only one sand recovery box in launder, but wasted fines are returned to pit and pumped over again, which results in more fine sand recovery

Walter Hines Sand and Gravel Co., Maumie, Ill., is example of simple dredging operation with single deck vibrating screen for sand-gravel separation. Sand is recovered from launder screen



McGrath plant at Pekin is recovering an ample amount of minus 50-mesh by means of 12- x 14-ft. steel tank, which overflows on three sides, giving a perimeter or weir 38 ft. long. The tank has a sloping bottom toward sand bin under the classifiers and is discharged by hand-operated valves

Calcium as a nitrate salt and as a chloride, without neutralizing soil acidity, made the two streaks of better soybeans on the right center as good as those given calcium hydrate which reduced the acidity on the left center

Agricultural limestone has come into its own — as a plant food and not merely a soil acidity remover. New studies reveal the vital importance of liming materials in restoring the soil

Agricultural Limestone— A LIFE-GIVING GRIST

By DR. WILLIAM A. ALBRECHT*

AGRICULTURAL LIMESTONE, once a dusty waste or at best a by-product in small demand, is now recognized as a fertilizer essential in the production of nutritious crops. It is now an important product of quarry and crusher, and is applied by millions of tons as a war-time necessity and subsidized by the government as a builder of productivity in the soil.

This development is not unlike that of the fertilizer industry as a whole. Once a scavenger business dealing in packing-house offal and its by-products, the making of fertilizer today is an important chemical industry, and its products are scientifically compounded prescriptions for plant nutrition and acclaimed everywhere as essential for better food production.

Thus, there has been a consistent advance toward better understanding of soil and practical maintenance of its normal content of nutrient elements. These elements plants must have if they are to produce the volume and the quality of food that humankind needs in order to be strong, healthy and progressive. As the scientists went deeper into chemistry, plant physiology and the functions of the soil, so also the quarrymen have gone deeper into the old, fossilized seabeds of rich limestone and have brought up, pulverized and put on the market a life-giving grist —a food for the soil itself!

*Department of Soils, College of Agriculture, University of Missouri.

The use of limestone on land has taken on a broader significance with our better understanding of how lime serves the plants. It was a custom to put limestone, marl, and other carriers of calcium on the land for the pulse crops; that is, beans, peas, lentils, or the legumes, as far back as Roman times. But this *art* of agriculture, which used lime as a fertilizer, was pushed into the background among the soil treatments sometime prior to 1850. It was then that the new science of chemistry pointed to the soil's more common shortages of nitrogen, phosphorus, and potassium. Liming as a soil treatment was pushed roughly aside when these other three essential elements came to the front under the banner of the commercial fertilizer industry. These three had the science of chemistry coupled with the practice of using them in agriculture to keep attention focused on them as the "complete fertilizers." Much of the phosphate that went into these fertilizers carried significant amounts of calcium, and this fourth element, unwittingly included in the manufacturing process, was giving success in the growing of some crops, which could have been grown even better by liming. Fertilizer use thus delayed recognition of the nutritional service by the calcium put on the soil in limestone, which might have been detected earlier had the old practice of liming as an established art not been so completely swept aside by the advent of fertilizers under the scientific banner.

Lime Came Back to Bring Legumes and to Fight Soil Acidity

The use of limestone as a soil treatment came back, however, in the early part of the nineteen hundreds. It was recognized as a help in growing legumes, the crops which are able to use some nitrogen from the soil air for their own tissue-building. In order to succeed with these crops that have nodule bacteria on their roots to carry on this process of nitrogen fixation, it was commonly found necessary to put limestone on the soil. Liming the soil became a standard practice in preparing to grow the legumes which are known to be excellent feed. At the same time they are a kind of farm factory to take gaseous nitrogen out of the air and combine it into plant tissue as a means of getting this elusive plant nutrient into the soil for its upbuilding.

When limestone was put on the soil, it was found that it not only improved the growth of many legumes, but it also reduced the soil acidity in general, regardless by which of the many disputedly proper methods this change was detected and measured. The reduction in the soil acidity that was an accompani-

ment of the better crop growth and a result of the limestone application was considered the cause in the crop's improvement. When about that time the chemists provided, in the hydrogen electrode, a delicate means for measuring the concentration of the hydrogen iron—which is the chemical item that makes the acid and gives the sour taste—there started a great wave of measuring the soil acidity promiscuously with fine distinctions of its degree to the decimal points of figures as pH. This opportunity to measure the degree of soil acidity with convenient colorimetric reagents and electrometric means, soon had almost every soil—productive or unproductive—tested. The tremendously widespread prevalence of acidity in the more intensively cultivated soils, and the extensive distribution of limestone deposits, soon brought forward the carbonate of calcium as limestone, its hydroxide as hydrated lime, and its oxide as quicklime, as the ammunition for help in the fight on soil acidity, which was considered a serious enemy of soil building by means of legumes.

Limestone Gives Plants Their Necessary Calcium

The wise use of limestone on soils has been found to be an excellent agricultural practice. Its excellence has consisted in its establishment anew of the legume crops which have long been recognized for their more proteinaceous forages with higher feeding values. Its service has been recently recognized in connection with non-legumes too. Just how it functions is a much more recent understanding of the soil processes.

The service of limestone in making better crops, both legume and non-legume, is no longer so much one of only reducing the soil acidity, it is rather one of supplying the plant with calcium. It is a provider of this essential for plant growth which is at the head of the list of the required elements coming from the soil for the production as well of animal and human bodies. It is, in addition, a carrier of magnesium in the dolomitic stones. Limestone also puts calcium where it mobilizes other plant nutrients into the crop.

That limestone serves this function by supplying calcium was demonstrated by applying calcium in its chloride form and calcium as a nitrate compound in contrast to calcium hydroxide in hydrated lime as fertilizers on a soil where legumes were doing poorly. The first two forms provide calcium but as the chloride and nitrate they do not reduce the soil acidity. The third also supplies calcium as a plant nutrient while its caustic nature reduces the acidity. Decided crop improvements resulted from all three of these treatments, regardless of whether the soil acidity was removed by the hydroxide of calcium or left undisturbed and possibly increased by the nitrate and chloride of calcium.

This demonstration laid the foundation for detailed experiments which separated the effect by the reduction of the acidity from the effect by the calcium as a plant nutrient when limestone is put on the soil. Plants originally considered sensitive to a particular degree of soil acidity, or limited to soils of a certain pH figure, were shown to tolerate increases of ten times the concentration of the soil acid by merely increasing by four times the calcium available to them. We can now say that plants tolerate soil acidity when they are well fed, much as we humans bear low temperatures much better on a full stomach.

Calcium has come to be recognized as a nutrient. The use of limestone is therefore not a matter of driving acidity out of the soil, but one of giving the plant some calcium, or magnesium, just as we give it fertilizer for the provision of any other element. Quarrying and crushing agricultural limestone are seemingly then a part of the great fertilizer industry. They are a help in the war program of increased food production. Producing agricultural limestone certainly is no longer a war on soil acidity.

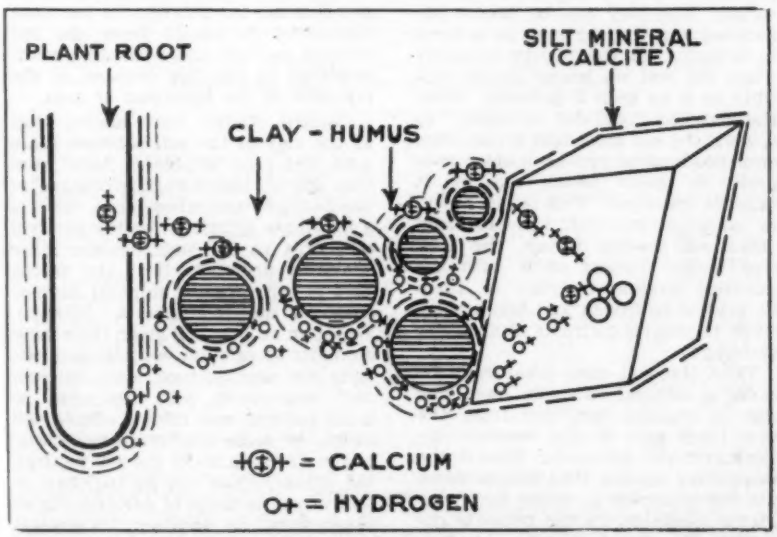
Soil Acidity a Blessing in Disguise

Though soil acidity is no longer an enemy, nevertheless our past struggles against it under this category served to elucidate the processes by which rocks or minerals, like limestone, in the soil are broken down and their nutrient contents mobilized into the plant.

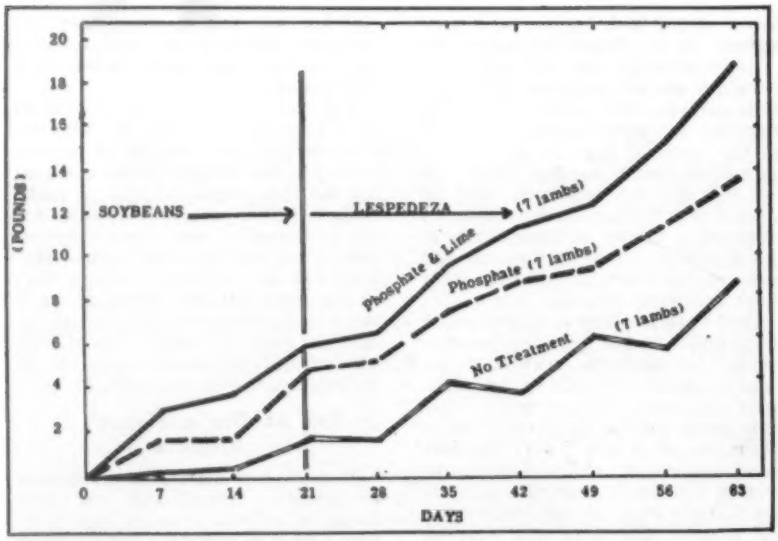
It was the separation of the finest clay from an acid soil in the studies of acidity that showed that the hydrogen ion or the acid element is held by the clay particle in a readily exchangeable form. There came about the better understanding of the behavior of the soil acid when this acid was discovered to be of the same nature as any other acid, and when that discovery finally pointed out the clay of the soil as the molecular part on which the more speedy chemical activity of the soil is centered. The clay has now come to be recognized as providing the seat of the activity in the soil that is feeding the plants and that is breaking down the soil minerals including the applied limestone. The clay or the colloidal fraction is in reality the dynamic mineral part of the soil. The study of the clay elucidated the soil and plant interactions by means of which crops are grown. Soil acidity proved a blessing in disguise through the studies of the soil prompted by it.

Mechanics of Soil Service to Plants

When the root grows through the soil as a living, breathing thing, it liberates carbon dioxide. This gas in the water of the moist soil forms carbonic acid and thereby puts many hydrogen ions into action. These are the most active of all chemical elements. They move to the clay surfaces that are in root contact and there change places with the calcium, the magnesium, the potassium, or any other plant nutrient of corresponding electrical charge held in exchangeable form on the colloidal clay. These nutrient elements pass into the plant to be built into its complexes and thus make way for



Mechanism of plant feeding. Plant nutrients, like calcium, on the colloid are exchanged for hydrogen. As the colloid clay and humus become exhausted, the nutrients move from the mineral to the root through the colloid, while the hydrogen, or acidity moves in the opposite direction



Curves of gains by lambs fed equal amounts of soybean and lespedeza hays for nine weeks from adjoining plots given different soil treatments show that lime makes the feed more efficient. Lime put in the soil does more than encourage the mineral calcium to hitch-hike to the manger

other nutrients brought in from the exchange by the hydrogen. Thus the plant is nourished while the clay is giving up its plant nutrients or its soil fertility. At the same time, the clay is becoming more highly saturated with hydrogen or attaining a higher degree of acidity.

Cropping a soil and the resulting removal of its fertility are consequently the equivalent of making a soil acid. On the converse then, when a soil has become acid, naturally or otherwise, this is merely another way of saying that with the coming in of the hydrogen there is the going out, not only of calcium, but also of magnesium, potassium, and many other elements that make up the list of them known to be essential for plant growth. Soil acidity is only partially cured when we apply calcium as limestone alone and neglect to consider other elements taken out of the soil much less rapidly than is this one particular element.

Soils Take a Rest

When we find that the clay can give up one-third of its exchangeable calcium and phosphorus, and three-fourths of its potassium to plant growth lasting only six weeks, we must immediately wonder how our unlimed and unfertilized soils have been producing continued crops year after year.

This question was answered by the work of Dr. E. R. Graham, when he took the silt mineral crystals out of many soils from various parts of the United States along a line of decreasing annual rainfalls, washed them thoroughly, and then put them into the completely acid clay. It was only a few months before the minerals from regions of lower rainfall had shown themselves breaking down, reducing the degree of acidity of the clay, and passing their liberated nutrient elements to the clay for adsorption there. After this reaction had taken place plants grew well in the clay-silt mixture while they would not grow well in the freshly made mixture or in either the mineral or the clay used separately.

We can now understand the service of the clay as the "jobber," as it were, in the soil. The clay accepts hydrogen from the plant root in trade for the nutrient elements the clay has in exchangeable form. It delivers this nutrient supply quickly and thereby permits the rapid plant growth and the mineral-rich composition of the young plant in the spring. The clay can be highly exhausted and thereby may be a force in bringing on the plant's maturity when the soil no longer passes fertility to it to keep it growing. After the clay has "sold out its stock," as it were, the soil must take a rest from crop production just as it does naturally in colder winter seasons. It must be restocked. This occurs when, by plowing, freezing, thawing, and other soil-moving forces, the acid clay makes contact anew with the mineral crystals to pass to them its acid or hydrogen and break them down to provide nutrient elements in exchange.

Thus the soil runs what may be called a mineral assembly line. The clay is passing hydrogen from the root itself and to the reserve unweathered soil minerals. This is the weathering agency that breaks down the soil minerals to make their nutrients available. In the opposite direction, the clay is passing this fertility supply so brought out for plant growth. It is the clay that is running this assembly line in serving as the jobber. It is the clay that takes hold of the particles of limestone applied to the soil and mobilizes their calcium contents for service in feeding to the plants this nutrient needed for their services in fabricating the complexes that are foods for animals and for us.

Acid, But Fertile, Soils Desirable

If, as we now recognize it, the presence of acidity or hydrogen in the soil results through the loss therefrom of many other nutrients beside calcium, it is not difficult to see that neutralizing the soil acid completely, or replacing all the soil hydrogen by calcium would not necessarily make the soil productive. Replacing the shortage of several nutrients by only one is not the restoration of a fertile soil. It is not providing all the nutrients the plant must have from the soil.

There is danger, in trying to put on enough lime to get rid of all the acid. For, in driving out all the hydrogen, that clings more firmly than any of the other elements, one would also drive out the last vestige of the elements used in too small amount by plants to be appreciated yet or well understood. Neutralizing the soil completely with only calcium is equivalent to courting trouble.

In the natural distribution of plants, there are but few important food plants that grow on neutral or alkaline soils. Most of the plants of service to us grow on acid soils. They are spread over a wide range of acidity. Alkalinity, however, of only a small degree eliminates plants almost completely. In fact we now recognize soil acidity as helpful. It is considered beneficial in reducing potato scab, but this service has been discovered to result from the increased calcium and potassium made available to the crop because of the presence of the hydrogen or acid.

Careful studies have shown that as the clay of the soil becomes more acid, the crop is able to take from that soil an increasing percentage of the calcium remaining there. This is a fortunate situation for the survival of plants as the soils become more decidedly depleted. It is also fortunate in terms of the mineral composition of our food plants. Spinach, grown on an acid soil given increasing amounts of calcium without neutralizing the acidity, took more calcium and magnesium into the crop as more calcium was offered. On a soil given the same amounts of calcium, but in forms to make the soil neutral, the spinach was not so enriched in its mineral content of calcium nor of magnesium. In addition, its oxalate content was high enough to make all these two minerals in it insoluble

(Continued on page 126)

Decreasing FUEL COSTS in Pulverized Coal-Fired Cement Kilns

By J. D. CLENDENIN*

EVERY cement plant operator is interested in decreasing his fuel costs. He also knows that numerous more or less feasible methods exist whereby lower fuel costs may be achieved. These methods fall into two general but closely related categories as follows:

(1) Methods that lower the unit fuel cost;

(2) Methods that lower the unit fuel consumption.

Much good engineering talent has been expended toward improving control of combustion, recovering waste heat, etc.; however, there is a point, depending upon the particular conditions, where diminishing returns preclude further economies with either general method.

At a few plants, which are favorably located with respect to the Anthracite Region of Pennsylvania, economies in fuel costs have been effected by using substantial percentages of fine-sized anthracite in admixture with bituminous coal for pulverized coal-fired rotary cement kilns. Nevertheless, too few operators with plants favorably located for using anthracite fines have carefully investigated[1,2,3] the possibilities of this method of decreasing fuel costs. For example, on the basis of Minerals Yearbook statistics on cement, it is estimated that the Eastern Pennsylvania-New Jersey cement region used about 1.5 and 1.9 millions tons of coal in 1940 and 1941, respectively, of which only about 5 percent was anthracite.

Utilizing Anthracite Fines

The principal reasons why so few cement plant operators, favorably situated, have not exploited the use of mixtures of anthracite and bituminous coal as a means of lowering fuel costs are: that the possibilities of this method are not fully appreciated; it is not generally known that some operators are mixing these two coals successfully; and the unawareness that the one particularly undesirable property of anthracite fines, their high moisture content as a consequence of wet preparation, might be changed by the anthracite producer to some low value comparable with that of the bituminous coals used, if market conditions warrant such reduction.

Anthracite fines (duff) have been used mixed with other coals for firing rotary cement kilns for upwards of 50 years in the British Isles[4]. Records[6,7] of tests made in Eastern Pennsylvania indicate that pulverized coal mixtures containing 20-25 per cent of anthracite can be burned quite satisfactorily providing the anthracite is of sufficiently low moisture content so as not to clog handling equipment or lower drier and pulverizer capacity.

Other reports[8] indicate that mixtures containing as much as 50 to 75 per cent anthracite fines are being burned successfully in firing cement kilns in Eastern Pennsylvania. The proportions that can be used at a particular plant depend upon the operating conditions, equipment capacities, bituminous coal used and the nature of anthracite most readily available. It has been found that the technical problems encountered in trying to burn the pulverized anthracite-bituminous mixtures can be solved with satisfaction by judicious changes in the following variables: somewhat finer grinding of the coal to compensate for the slower ignition rate of the anthracite; adjusting the diameter of the burner to properly locate the flame; and selecting the proportions of anthracite and bituminous coal which will maintain the same gas volume and gas velocity that exists or has been established for a particular plant in order that optimum heat transfer is maintained.

Manifestly, the amount of anthracite that can or will be used with bituminous coal is determined by the relative cost[5] of the two coals, although under favorable cost conditions it would also be limited by the combustion and heat transfer factors mentioned above.

How Fuel Costs are Reduced

To illustrate the reduction in fuel cost that might accrue from the use of anthracite with bituminous coal in pulverized firing, Table I has been compiled for a 50-50 mixture of anthracite fines and bituminous coal. It is based on the assumptions listed which are believed to be reasonable. Quoting a delivered cost for the coal on a dry basis gives an increase as compared with the cost of as received coal which may be considered as a substantial portion of a drying cost; the delivered cost, as received, may be readily computed from the dry basis cost.

From the table it may be seen that at $4.50 per ton delivered for bituminous coal of 13,750 Btu./lb. dry basis, the fuel cost per barrel of finished cement at 80 lbs. of coal per barrel is 18.6 cents, including 0.6 cents per barrel of cement as grinding cost for the coal. If it were pos-

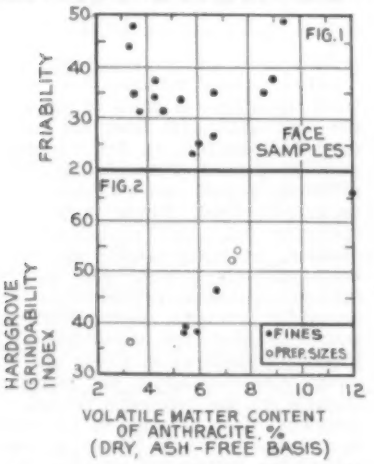
TABLE I: EFFECT OF ANTHRACITE ADDITIONS ON FUEL COST UNDER CONDITIONS INDICATED FOR A 50-50 MIXTURE

	% Coal				
Delivered Cost per Ton Coal (dry basis)	100	B (bituminous)	$4.50	$4.00	$3.75
Fuel Cost/bbl. cement*	100	B	0.186	0.166	0.156
Delivered Cost per Ton Coal (dry basis)	100	A (anthracite)	3.75	3.25	2.75
Fuel Cost/bbl. cement*	100	A	0.178	0.156	0.134
(1) Delivered Cost of Coals per ton, dry basis		B	$4.50	$4.50	$4.50
		A	3.75	3.25	2.75
(2) Fuel Cost/bbl. cement*		50-50:A-B	0.182	0.171	0.160
(1) Delivered Cost of Coals per ton, dry basis		B	4.00	4.00	4.00
		A	3.75	3.25	2.75
(2) Fuel Cost/bbl. cement*		50-50:A-B	0.172	0.161	0.150
(1) Delivered Cost of Coals per ton, dry basis		B	3.75	3.75	3.75
		A	3.75	3.25	2.75
(2) Fuel Cost/bbl. cement*		50-50:A-B	0.167	0.156	0.145

*Based on following assumptions: bituminous coal 13,750 Btu./lb. dry basis @ fuel consumption 80 lb./bbl. ordinary cement or 1.1 million Btu./bbl. cement; anthracite fines 12,500 Btu./lb. @ 15% ash. Grinding cost 15c/T. or 0.6c/bbl. for bituminous coal; 30c/T. or 1.32c/bbl. cement for anthracite fines. The fuel cost per bbl. cement includes the grinding cost, but no drying cost except insofar as the delivered cost of the coal on the dry basis would account for it.

*Assistant Professor of Fuel Technology, The Pennsylvania State College. Contributed by the Mineral Industries Experiment Station, The Pennsylvania State College.

sible to use 50 percent of anthracite of 12,500 Btu./lb. dry basis (15 percent ash), costing $3.25 per ton delivered with 50 percent of the $4.50 coal, it would be possible to lower the fuel cost per barrel of cement to 17.1 cents or a decrease of 1.5 cents.

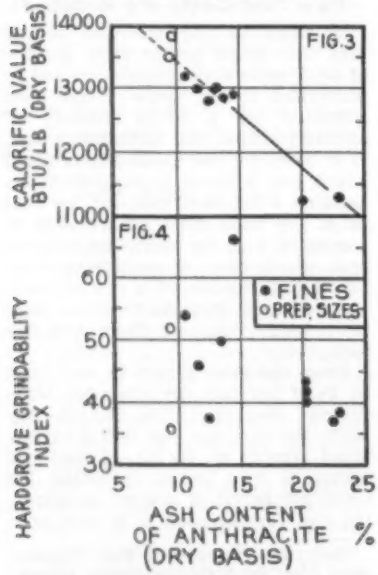


Figs. 1 and 2: Charts illustrating the wide differences found in the strength and hardness properties of anthracites

Using 25 percent anthracite, under the same conditions, the reduction in fuel cost per barrel of cement would be 0.75 cents. The relative effect of the decreasing or increasing costs of the two coals can be noted in the table for the 50-50 mixtures.

One interesting but not too well known or generally appreciated fact about anthracites (and semianthracites) is that their characteristics vary nearly as widely as do those of bituminous coals. Although it is generally recognized[9] that empirical tests for determining the relative ease of degradation or pulverization of coals usually rank the coals arbitrarily depending upon the test method, the friability[11] and grindability[12] results[9,10] in Figs. 1 and 2 illustrate the rather wide differences found in the strength and hardness properties of anthracites. In these charts the volatile content is evidently some indirect measure of a more intrinsic property of the anthracites.

It is common knowledge to a cement plant operator firing pulverized coal that both the calorific value of a coal and the ease with which it can be pulverized decrease as the ash content increases. This is evident from Figs. 3 and 4 which show the calorific value and grindability indices of various anthracites vs. their respective ash contents. It appears that below about 15 percent ash the grindability index is affected to a considerable extent by some more intrinsic characteristic of the anthracite which is reflected in its volatile content.



Figs. 3 and 4: Showing calorific value and grindability indices of various anthracites versus their respective ash contents

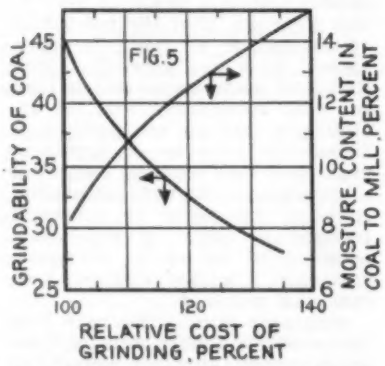


Fig. 5: Effect of grindability and moisture content on relative grinding cost of coal

The straight-line relationship shown in Fig. 3 is expressed by the following equation:

$H = 15{,}100 - 166.9A$

where H = the calculated heating value in Btu./lb. (dry basis), and A = percent ash content (dry basis). The average deviation of the calculated heating value for anthracite silt of 15 to 60 per cent ash content is reported[14] to be ±1.6 percent.

The desirability of obtaining anthracite fines of lower moisture content is clearly demonstrated in Fig. 5 in which the effect of the moisture content of anthracite on the relative cost of grinding is shown.[15] Presumably the 100 percent relative grinding cost represents that for a mill designed to take a feed of about eight percent moisture, and certainly reducing the moisture still further would decrease grinding costs. The effect of the grindability of the coal (doubtless the Hardgrove grindability index) on the relative cost of grinding is shown[15] in the same figure, with the 100 percent cost based, evidently, on a coal of 45 grindability. Anthracites of higher grindability than 45 are shown in Figs. 2 and 4; the selection and use of more grindable anthracites would decrease relative grinding costs.

The sulphur and ash characteristics of anthracite fines are not unfavorable with respect to their use for cement kiln fuel. In general, 0.5 percent is the maximum sulphur content for prepared No. 5 buckwheat anthracite, while, depending upon the extent of beneficiation, 0.75 to 1 per cent is the probable maximum for finer-sized anthracites used for kiln fuel. In anthracite ash the content of iron oxide, lime and magnesia is generally much lower than that found in bituminous coal ash.

Conclusion

In those localities where the freight-rate conditions are favorable, there is every reason to believe that operators of pulverized coal-fired rotary cement (or lime) kilns can effect appreciable savings in fuel costs with a minimum of equipment changes by using substantial percentages of selected anthracite fines of low moisture content in admixture with bituminous coal.

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Plenty of Limestone

MISSOURI GEOLOGICAL SURVEY has been making a survey around Bethany, Mo., to determine the extent of Bethany Falls limestone. Dr. David Dunkle, formerly of Western Reserve University, collected samples of stone from 38 quarries, both old and new, and specimens from outcroppings at various places and has reported that ample limestone at workable depths is available for many years.

Replacing Obsolete Equipment

Methods of financing purchase of new equipment without impairing working capital

By W. G. JORGENSON*

SPEEDY REPLACEMENT of worn out and obsolete equipment is one of the most important tasks facing industry. In order to handle the vast amount of work which lies ahead, adequate machinery is a "must" for every producer.

This vital element in the post-war plans of industry has caused management much concern. How to meet the cost of making extensive replacements without impairing working capital, often presents an aggravating problem.

Much of this new equipment must be built to order, and the time element is an important factor. The firms who are first equipped with the proper implements are the ones who will be in the best position to supply the materials which are essential to America's reconstruction program.

Almost every producer is fully aware of these obvious facts and, now that equipment manufacturers are taking orders for future delivery, a general rush to buy would result were it not for one important factor —money with which to complete the purchase!

When contemplated purchases involve one or more relatively inexpensive items of equipment, financing is a simple matter. The purchaser either pays cash, arranges instalment terms with the distributor or borrows the money—the amount being small, repayment is simply a matter of anticipating how fast money will come in from work under way.

However, where a producer is faced with a plant modernization program which calls for the installation of many pieces of equipment, the amount involved becomes a serious problem and requires careful planning to avoid curtailment of activities due to lack of operating capital.

Extended periods may be necessary to retire the investment and, to tie up working funds for this length of time which should be used for business promotion, tax payments, pay rolls and other essential items, could become a serious handicap. Many firms, faced with the problem of financing reconversion or plant expansion, have used outside capital which can be obtained from a finance company like the C.I.T. Corporation, that specializes in industrial financing.

*C. I. T. Corporation.

To illustrate how a producer would go about obtaining additional capital, let's take a typical example; the case of the "Jones Production Company."

This company has directed their entire time and output to the war effort. They have supplied materials, through contractors, for construction of camps, roads and bases for the use of the Armed Forces.

Working under pressure to maintain wartime schedules has worn out much of their hard-driven machinery . . . and no replacements have been possible due to shortages of critical material.

Cut-backs and cancellation of war contracts have now put them in a position to again fill orders for other than wartime uses—profits are in sight—urgent demands are being made for material—and it is essential to install the modern equipment needed to keep pace with peacetime activities.

The president—let's call him John Jones—has had complete plans drawn up by his engineers for the modernization of the plant. These ideas not only include alterations, but call for several new machines and a variety of plant equipment.

Estimates from contractors, manufacturers and suppliers indicate that an investment of $200,000 is required. Taxes and high operating costs had made it difficult to accumulate a large cash reserve and it would be impracticable for the company to use their working funds for this capital investment.

Types of Financing

The logical solution was to obtain additional funds, and John Jones must decide which of three available methods is best suited to the needs of his company.

(a) To obtain funds through a short term bank loan.

(b) Floating an issue of stock.

(c) Arranging a term loan through a finance company.

Analyzing the alternative methods brought out these salient points: In plan "A" short term financing would not meet the situation as extended time in which to amortize the obligation was a pre-requisite.

Method "B" was eliminated due to the high cost involved. A recent survey made by Security Exchange Commission shows that the cost of floating a stock issue of $100,000 averaged 21.6 percent. While larger issues cost proportionately less, legal fees, registration, printing and underwriting fees involved a cost that made the plan prohibitive. Further objections proved to be the time required to negotiate the sale of the securities plus the resulting dilution of stock interests.

Term loan financing, plan "C," seemed to offer the ideal solution to the problem. Compared with the difficulties and expense of floating a stock issue, this method was much more economical. Therefore, John Jones decided to arrange a long term loan for $200,000 which was to be amortized over a period of years.

Financing Procedure

Negotiations with the finance company's executives resulted in an agreement on rates, terms and a plan of fixed amortization. As collateral, a mortgage was given on the equipment and machinery. The full amount required was made available for immediate (or future) use and the Jones Production Co. had the unhampered use of the additional capital they required to put their reconstruction program into full operation. Their own working funds were left free for operating use and the obligation could be retired over a long period of time, largely out of the increased earning capacity of the improved plant facilities.

Another typical case involves a contracting firm, we'll call them Smith & Co., who needed to replace several items of equipment. Added together, this machinery represented a substantial investment and rather than divert operating funds for the purchase, it was decided to have a finance company handle the transaction.

The amount required totalled $25,000 and was made up of items of equipment bought from four different distributors. The matter was discussed with the finance company and

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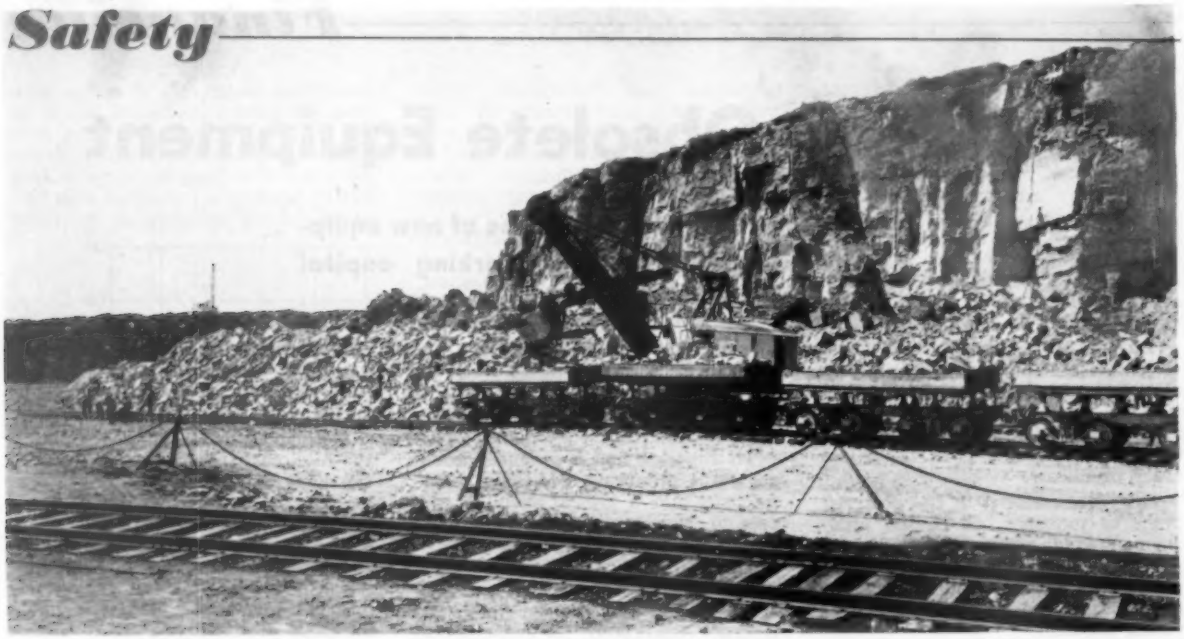


Electric shovel loading quarry cars. In the foreground is shown how power cables are supported above the ground on tripods

Eliminate QUARRY Accidents

Safety practices at the Hudson, N. Y., quarry of Universal Atlas Cement Co.

By A. W. WORCESTER*

RECORDS show the date of the last disabling injury at the Hudson, N. Y., plant, Universal Atlas Cement Co., as November 12, 1943, making a run of 571 consecutive accident-free days to the present time.

The Hudson plant was one of 27 plants awarded or reawarded the Portland Cement Association safety trophy for the calendar year 1944, during which it operated without a disability. Previous perfectly safe calendar years reported by this plant were 1936 and 1939.

The best long-run safety record established by the Hudson plant was from June 14, 1938, to May 21, 1940, a period of 705 safe days. Previously, the plant had a safe period of 523 days, from October 31, 1935, to April 7, 1937. The plant is within striking distance of its 705-day mark and may be approaching membership in the Thousand Day Club of the Portland Cement Association for plants having operated 1000 consecutive accident-free days. A large measure of credit for this record may be attributed to the fact that management considers safety to be first in importance throughout the operation.

The Hudson Quarry of the Universal Atlas Cement Co. is about 1 mile south of Hudson, N. Y., on the east side of U. S. Highway 9. It is about half a mile east of the highway, and the cement plant is adjacent to the same highway, but is on the west side of it. Scott Wilson is plant manager, and Robert L. Storms is quarry superintendent.

Operating one 8-hour shift 5 days a week the quarry delivers an average of 1200 tons of crushed limestone a day to the cement plant. There are 20 employes in the quarry and crushing plant.

Quarry Characteristics

Limestone beds being worked outcrop on the surface and dip from almost horizontal to about 30 degrees to the south and east. Tilting of the beds has produced numerous vertical fractures and a rolling surface topography. With depth, the beds are silicified to such an extent that the rock is not suitable for making cement, and in places silicification has reached the surface, so that considerable waste material has to be quarried at times.

The quarry, which has been opened by a narrow cut through the limestone, has been widened gradually on both sides to form the present face, which is roughly circular in shape and 1500 to 2000 ft. in diameter. Owing to the tilting and faulting of the beds and resulting irregular surface topography, the face varies in height from 25 to 110 ft. from the quarry floor, the average being about 65 ft. The floor of the quarry rises gradually from the entrance to permit natural drainage through the entrance cut.

A standard-gage track has been laid on the quarry floor and carried through the entrance cut to the crusher house situated on a hillside near the entrance. The rock is transported from the crushing plant to the cement plant on a 30-in., housed conveyor belt 1200 ft. long.

At the crushing plant, the cars are dumped directly into a 42-in. Traylor crusher by means of a pneumatic ram. From the crusher, the rock is fed to a Pennsylvania hammer mill by a steel-pan conveyor; the hammer mill is in closed circuit with a vibrating screen, so that all of the crushed rock delivered to the conveyor belt is minus 1-in. in size. At the discharge end of the 1200-ft. conveyor belt, the rock is fed by gravity to a smaller hammer mill, which further reduces it to about ½-in. The crushing plant is equipped

*Mining Engineer, Bureau of Mines, Albany, N. Y. Article published by permission of the Director, Bureau of Mines, U. S. Department of the Interior.

with an efficient dust-collecting system. The crushing plant and conveyor housing are fire-resistant, built of concrete, steel and transite. Approved fire extinguishers are provided at strategic places throughout the plant, so installed that they are readily recognizable.

From the second hammer mill, the crushed product is carried on another housed conveyor belt, approximately 600 ft. long, across the highway and into the storage bin at the plant.

All stairways, landings and moving machinery are properly guarded, and housekeeping is excellent throughout the crushing plant and conveyor house.

Primary Drilling

Prior to drilling, the top of the limestone is stripped of overburden consisting of about one foot of soil, which is removed by a bulldozer. Churn drills of two sizes are used; one No. 29T Bucyrus-Armstrong, which drills 9-in. holes, and two Cyclone drills, which drill 6-in. holes. All drills are electrically powered, using 440-volt alternating current. All holes are drilled vertically to a depth of 5 ft. below the quarry-floor elevation.

The 6-in. holes are drilled about 22 ft. back of the face and are about 13 ft. apart. The 9-in. holes are drilled about 35 ft. back from the vertical face and about 25 ft. apart.

Primary Blasting

Before loading the holes, a sketch is made of their location and depth, and a chart is drawn up on which the burden of each hole is calculated and the amount of explosives to be loaded in each hole is determined.

Three grades or strengths of explosives are used in each hole, the highest being placed in the bottom and the lowest at the top of the charge. Cartridges 7- x 24-in. in size are used in the 9-in. holes and 5- x 24-in. cartridges are placed in the 6-in. holes.

Explosives are delivered, one truck load at a time, adjacent to the holes, and all explosives are lowered into the holes by light cord. Reinforced Primacord is attached to the first cartridge lowered. Tamping is done with wooden dollys containing a nonsparking metal core for extra weight. The collars of all holes are stemmed with soil after loading is completed, and a trunk line of regular Primacord is connected with each hole. The blast is detonated by means of a No. 6 electric detonator attached to the trunk line and ignited from the 440-volt power line. Locked blasting switches are used, and a siren is sounded to give the blasting signal. The number of holes blasted at one time varies from 10 to 20. The following data were obtained from the logs of recent blasts:

Ten 9-in. holes 51 to 63 ft. in depth used 900 to 1900 lbs. of explosives per hole, totaling 12,500 lbs. for the 10 holes. Estimated tonnage of burden, or tons blasted is 38,160. This gives a consumption of 1 lb. of explosives for 3.05 tons broken.

Nineteen 6-in. holes 35 to 50 ft. in depth used 250 to 500 lbs. explosives per hole, totaling 7,100 lbs. for the 19 holes. Estimated tonnage broken is 21,867, showing a consumption of 1 lb. of explosives for 3.08 tons broken.

Secondary Drilling and Blasting

Due to numerous cross fractures, much of the blasted rock is still too large for shovel loading and also too large to enter the crusher. Secondary blasting is therefore necessary. Block holes are drilled with jackhammers, using ⅞-in. hexagon steel with forged 6-pointed bits. A 4-ft. fuse and No. 6 blasting caps are used for detonating the explosives with hot-wire igniters to ignite the fuse. A "safety fuse," cut 2 ft. long, is attached to a cap and is "spit" at the same time as the fuses of the holes to be blasted. When the cap on the "safety fuse" detonates, workers cease "spitting" the block holes and retire to heavy steel blasting shelters provided at convenient points on the quarry floor. A siren is used as a warning signal during blasting operations. Blasting instructions are posted in the quarry and include the burning rate of the fuse being used. Controlling the time men are engaged in "spitting" fuses by the method given can be disastrous in event the cap fails to detonate, and precautions must be taken. An observer can see when the "safety fuse" stops burning.

To insure that the fuse is cut in exactly 4-ft. lengths, a "California" bench-type cap crimper and a homemade fuse cutter have been placed on a bench and both attached to a foot lever that cuts the fuse while it is being crimped. On a board, another cutter and crimper have been placed 2 ft. apart for use in cutting the "safety fuse." An additional safety feature is testing with a stopwatch, the burning speed of every 100th fuse used.

The blasted limestone is loaded into 25-ton, all-steel, side-dump cars by electric shovels. Two No. 85-B Bucyrus shovels equipped with 2½-cu. yd. shovels are used for loading. Both shovels operate on 2300-volt alternating current. Two safety features worthy of mention have been incorporated on these shovels. A shallow platform has been mounted on the back of each shovel, in which the extra trailing cable is coiled. This provides an easy way of properly storing the cable and also allows the shovel to back 8 or 10 ft. before there is danger of running over the cable. A push button has been mounted on each of the two rear corners of the shovel cab, so that a worker on the ground can push the button in case of emergency. The button operates a signaling device in the cab, and the operator is instructed to stop the shovel from operating on receiving the warning signal. According to the quarry superintendent, this installation has averted several accidents, some of which might have been fatal. Trains of three cars are pulled to the crushing plant by American 35-ton steam locomotives.

(Continued on page 133)

General view of Hudson, N. Y., quarry. In the distance may be seen the tripod and tower arrangement for carrying power cables

Present extensive quarry development of the Monon Crushed Stone Company

Sells Stone Business On Royalty

Monon Crushed Stone Co. sold on long term royalty deal, probably involving largest sale of crushed stone property by individuals on that basis

HER many friends throughout the crushed stone industry will be surprised to learn that Grace M. Evans, owner and operator of the Monon Crushed Stone Co., Monon, Ind., has retired, as a crushed stone producer, after a long and successful career to devote her energies to her extensive farm holdings in Indiana and her property in Florida.

In what is probably the largest outright sale of a crushed stone property between two individuals on a royalty basis, GEORGE BOZICH took over the reins of the company effective August 1.

GRACE M. EVANS has guided the business affairs of the company through two major wars and through depressions and booms, since 1918 when her husband, Herman E. Evans, died, building the business into one of the most profitable crushed stone enterprises in Indiana, with a rated daily capacity of 3500 tons at the time of sale. Hers had been an uphill and difficult job from the beginning and it is a tribute to her genius in business affairs, as an individual, that the Monon Crushed Stone Co. grew to the prominence it enjoys.

To those unacquainted with Mrs. Evans, she had no qualms about donning overalls and digging into hard work at the plant when necessary, since hers was a practical, working knowledge of the business, including production, from A to Z. It wasn't unusual for her to operate a power shovel or a quarry locomotive or to do other skilled and unskilled work around the plant. But, it was novel to the moving picture industry back in the late 20's when moving pictures were taken of her loading ten cars of stone with a power shovel; then jumping out of the cab to operate the locomotive and haul the cars to the plant incline. We are told that that film was shown from coast to coast.

Mrs. Evans probably was the first woman to head a crushed stone company, certainly, in an active operating capacity. Her policy always was one of consistent promotion of crushed stone and she has been very active in the affairs of the National Crushed Stone Association and, for many years, had been in regular attendance at the national conventions and regional meetings.

Her talents by no means have been confined to the business of producing and selling crushed stone. She has travelled widely outside this country and has national renown as a deep sea fisherwoman. We understand she is holder of the world's record for

In the early days of quarry haulage horsepower meant horses

George Bozich, the new owner of the quarry, has been operating quarries in the Chicago area for many years

catching sail fish in Florida—five specimens from 40 to 55 lb. caught within 2½ hr. She also has the reputation for a fine taste in horticulture and agriculture and a real down-to-earth grasp of farming which now will be her main occupation.

Mr. Bozich, who succeeds Grace M. Evans as proprietor of the Monon Crushed Stone Co. has a background of 39 years of operating experience in the crushed stone industry. For the past 15 years he has been in charge of production at the big Thornton plant of the Material Service Corp. His sons, Jack, recently discharged from the Navy, and Herman, a soldier on his way home from overseas, are to be associated with him.

Modernize Plant

The plant has been modernized to a considerable extent, and capacity increased, since the early days when horse-drawn "buggies" delivered stone to the plant incline. It was back in 1919 that the first large shipment of stone was made from the plant when a train of 11 cars went forward. Today, the company regularly ships over four times that amount daily, much of it in trucks.

Principal products are aggregates for concrete and bituminous concrete, railroad ballast, road stone, screenings, chips for asphaltic roads and agricultural limestone. The deposit has very favorable physical characteristics, the stone being a dolomite of extraordinarily high neutralizing value. An article back in 1928 tells of shipping 200 cars of agricultural stone annually; today, agstone shipments represent 60,000 tons annually.

The quarry property comprises 160 acres all underlaid with stone, of which about 40 acres are under development. From three inches to four feet of loam covers the rock, which is at least 265 ft. deep in places, several water wells having been driven to that depth which are still in stone. The rock is a hard, dense dolomite, best known as "blue" limestone, and similar in many respects to the blue dolomite quarried in parts of Ohio.

The present face has been developed in an elliptical manner, the periphery totalling about 2850 ft. The quarry is worked in two benches, the first has a height of 50 ft. and the second of 35 ft., the lower level opening having been developed to 200 ft. width. Eventually, the entire quarry floor will be about 85 ft. below the surface.

Mrs. Grace M. Evans, who was identified with ownership and operation of the quarry from 1918 to the fall of 1945

In the early days, the quarry was hand-operated and cars were loaded on a piece-work basis. Locomotive haul on narrow-gauge track has been employed in the quarry up until the time of sale when six WA-20 White trucks were on order, soon to go into service.

(Continued on page 131)

Right: Looking toward part of the extensive quarry face. In the foreground may be seen what remains of a shovel destroyed when an excessive amount of explosive was used in blasting

Below: Mrs. Evans standing near the controls of one of the company's modern power shovels

Economical Manufacture of QUALITY LIME

Part 3: Determination of temperature difference and heat transfer rate prevailing in lime kilns

By VICTOR J. AZBE*

In the two preceding articles, the subjects of Kiln Efficiency and Factors Controlling Gas Flow were discussed. In the first article, Fig. 1 presented graphically the heat requirements for preheating and calcining limestone for one pound of CaO and the heat to be abstracted to cool this quantity to atmospheric temperature in the cooler of the kiln (see ROCK PRODUCTS, August, 1945, p. 92).

TABLE 11

Heat required to preheat pure high calcium stone to 1648 deg. F.			862 Btu.
Heat of dissociation of $CaCO_3$ per lb. of CaO			1212 Btu.
Heat required in bringing lime to hot zone temperature			175 Btu.
Total heat to be imparted in calcining and preheating zone			2249 Btu.
Heat to be abstracted in cooling of lime			557 Btu.

If packing is to 50 percent voids, one cubic foot of preheater space will contain 84 lbs. of stone. This is equivalent to 46.6 lbs. of lime. Each cubic foot of 50 percent void space will require:

Preheating Zone:	Heat of preheating per cu. ft. Btu.	40200	30.7%
Calcination Zone:	Heat of Calcination	56500	49.4%
	Heat of heating CaO to 270 deg. F.	8160	
	Imparted:	104860	Btu.
Cooler:	Heat of Cooling: Extracted:	25980	19.9%
	Total Exchange	130640	

For one pound of CaO, 1,785 lbs. of stone are required and to preheat this to the dissociation temperature of 1648 deg. F., 862 Btu. are necessary. As the chart shows, the heat of dissociation at this temperature is 1212 Btu., so that if all lime was made at this temperature, the total heat to be imparted to the limestone would be 2002 Btu. However, most of the lime acquires the hot zone temperature of around 2400 deg. F., and to heat it to this point from 1648 deg. F., an additional 175 Btu. is needed, or in all 2249 Btu. Following this, if lime is cooled in the cooler 557 Btu. needs to be transferred over to the up-passing air.

If voids are more, and they are very likely to be more in the case of lime, heat demands of the respective zone will be correspondingly different.

A considerable portion of the hot zone heat will be transferred by radiation, while in the other two zones most of it will be by convection; in either case it will depend on the amount of total surface active in any given volume, on luminosity of the burning gases, on temperature difference, and on time or rate of calcination. The surface will vary with stone size and degree of obstruction, as shown by Fig. 4 (see ROCK PRODUCTS, September, 1945, p. 81), and temperature difference will be treated in the following section.

There is no ready manner in which one could calculate temperature difference prevailing in a vertical kiln although it is possible in the case of separate coolers and preheaters as the process there proceeds in a definite sequence. Even if the kiln were charged and drawn continuously, it still would not be possible because no kiln is uniformly active throughout. Most of them have even an unsuspected idle zone of variable extent, where gases and stone have arrived to the same temperature and although high temperatures exist, very little heat interchange can take place. The preheating zone functions from the kiln top downward, the calcining zone functions from the bottom up. The lime kiln cooler may act either one or the other way, depending on whether a large or small proportion of total combustion air is passing through.

Temperature Difference, the Idle Zone

Fig. 8 is the result of an attempt to portray what passes on in a kiln operating at high capacity It gives the temperature of the lime through the kiln and with this, the temperature difference; "C" is the inactive zone which may be greatest in extent in kilns of disproportionately large surface for capacity obtained. A kiln

(Continued on page 104)

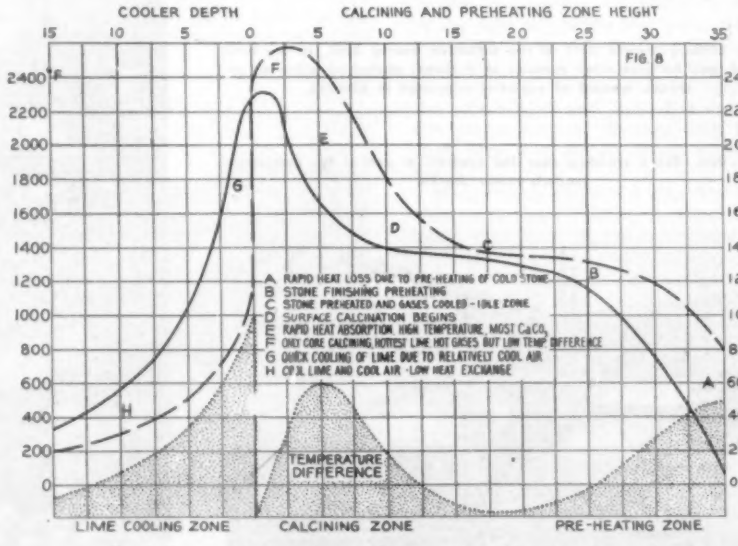
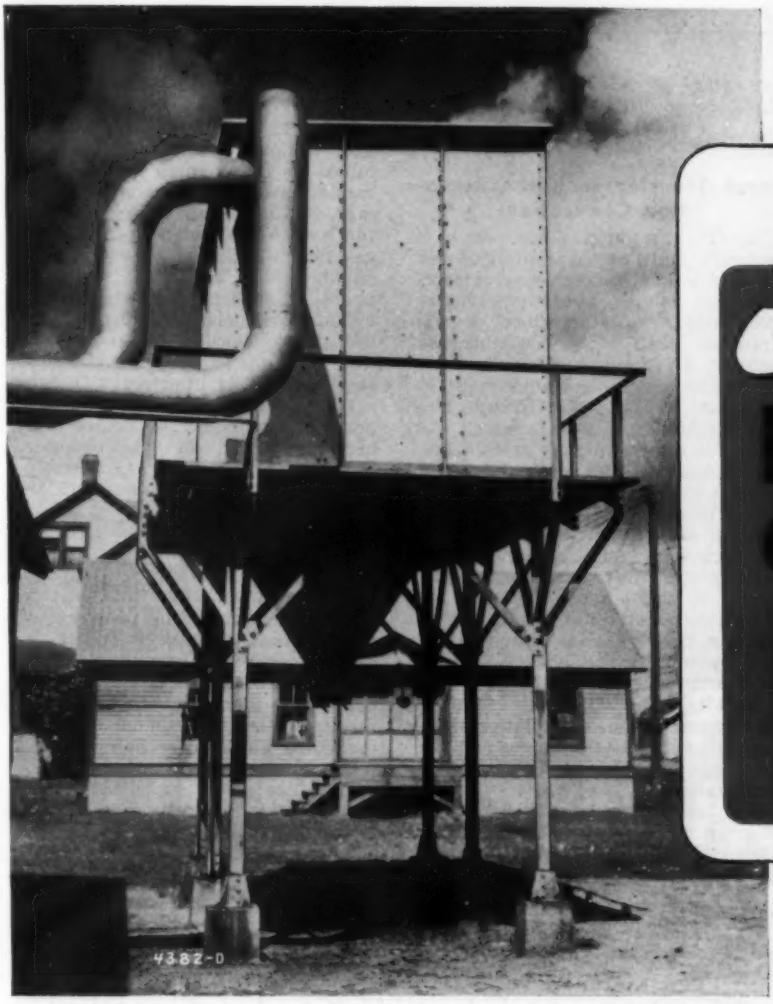

COOLER DEPTH
CALCINING AND PREHEATING ZONE HEIGHT
FIG 8
A RAPID HEAT LOSS DUE TO PRE-HEATING OF COLD STONE
B STONE FINISHING PREHEATING
C STONE PREHEATED AND GASES COOLED - IDLE ZONE
D SURFACE CALCINATION BEGINS
E RAPID HEAT ABSORPTION HIGH TEMPERATURE, MOST CaCO3 ONLY CORE CALCINING, HOTTEST LIME HOT GASES BUT LOW TEMP DIFFERENCE
F QUICK COOLING OF LIME DUE TO RELATIVELY COOL AIR
G COOL LIME AND COOL AIR - LOW HEAT EXCHANGE
H
TEMPERATURE DIFFERENCE
LIME COOLING ZONE
CALCINING ZONE
PRE-HEATING ZONE

Fig. 8: Temperature variation and difference through a well operated kiln

*From a paper presented before the Canadian Institute of Mining and Metallurgical Engineers.



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with large stone may be active throughout, while a kiln of the same height and capacity but calcining small stone will naturally be more active in the top where stone is preheated and, of course, also more active in the hot zone where the calcining is done. This increased activity is due to greater surface and less heat penetration required. With all this work taking place at the two ends, the middle section is not doing anything at all, and while it will be a cherry red heat, both gas and stone will be at the same temperature. In some extreme cases the idle zone may be 20 out of the 35-ft. height, the idle zone not helping but in fact, interferring with proper operation due to the additional resistance and higher operating draft necessary.

In addition to this idle zone, there are several other states of idleness in the kiln. One is due to variability in size, the portion of smallest size becoming heated much faster than that with larger pieces, possibly even to the temperature of the gas, after which, except for some re-radiation and conduction, it occupies space without further heat transfer until it is moved to a hotter zone, or a hotter stream of gas comes by.

In the hot zone the small stone becomes lime. Then they must await completion of calcination of the large stone which, if twice as large, will take at least twice as long. Here also much space goes to waste due to size variability. This may or may not be in part compensated through greater voids and greater flow around the large than the small stone.

There is still a third idle state which will be studied later on. It deals with what really counts in the hot zone; namely, the calcining surface, which is the outer surface when calcination begins, but thereafter the surface of the boundary between limestone and lime which is getting progressively less until the end of calcination. If the hot zone is filled with large pieces there will be less of this active surface; that is, the zone will be filled to a good portion with lime which properly should be moved out, but it cannot as it is awaiting completion of calcination.

Since the aim is to burn lime to no core, the determining factor is not the range of sizes of say from 4 to 8 in., or the mean of all sizes, but actually the *minimum dimension of the largest pieces one expects to draw without core.* This is the size which will heat up last in the preheating zone, calcine last in the hot zone and cool last in the cooler. This is also the size to which the heights of these zones should be proportioned, as it will take the longest time for the process to complete.

Ideally it would be best if nothing be fed to the kiln but the largest size, and this largest size be small, for when stone is mixed, there is none or only little benefit and chiefly only gas flow interference from small sizes.

Heat Transfer to Kilns—Radiation, Convection

In the preceding article, we, in a measure, clarified the subject of bed resistance, gas flow, effective surface, effective volume, and temperature difference. Next is the subject of heat transfer, itself a very complicated subject, which never was fully mastered and which we cannot hope to do either. We may merely expect to put the subject on a basis which will allow us to reason and to calculate approximately the results obtained from kilns, coolers and preheaters. In all this, however, we have the advantage of being in position of working back from results of actual operating units. Thus while we may be wrong in estimations of surface or temperature difference, or heat transfer rate, the errors are compensating and therefore still allow of a fairly close solution.

Heat transfer will be by radiation and by convection; by radiation varying with luminosity of gasses and the difference of the fourth powers of temperature of the two media; by convection varying as the 0.7 power of mass velocity, strictly a friction phenomenon, that is scrubbing away of the dead film of gas to bring to the surface a fresh layer, to be either heated or cooled.

Friction, therefore, that is draft loss, is not a waste of power, and unless we have a high draft loss, we cannot have high heat transfer. However, to fully apply, it requires that the bed be uniformly open and that gas flow through it be equally distributed. High friction is not a desirable condition when brought on by undue velocity in one section of bed, due to blocking of another section, as happens when an abnormal amount of fines interfere with flow.

Luminosity is an increasingly important factor as the temperature becomes higher, and the combined heat transfer by radiation and convection in the hot zone, where the gases are luminous, may be several times greater for the same temperature difference than it can be in the preheating zone where heat transfer is mainly by convection only.

For heat transfer by radiation we do not need velocity; it is not dependent on fan power. A long, hot flame is needed. But a hot flame is not a long flame except as it is the result of delayed combustion with preheated air, rather than with excess air or air quickly mixed with the combustible gases. An effective lime cooler on a kiln returning highly preheated air will tend to increase the portion of heat transferred by radia-

(Continued on page 106)

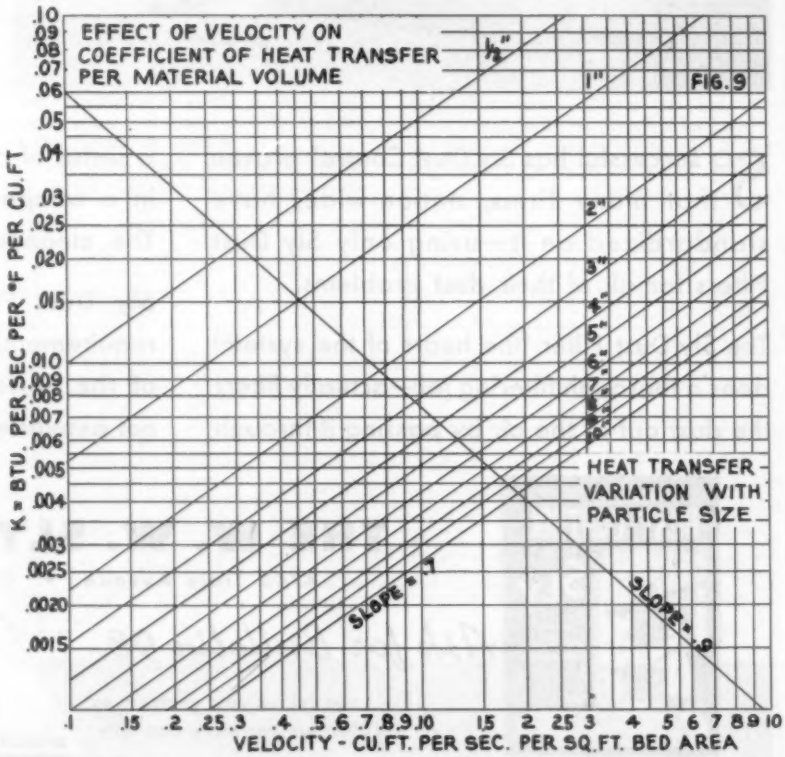

Fig. 9: Graph for estimating cross-sectional area of bed available to gas flow to determine velocity

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tion, and will tend to shorten up the hot zone, making it more active. For efficiency purposes this is desirable,

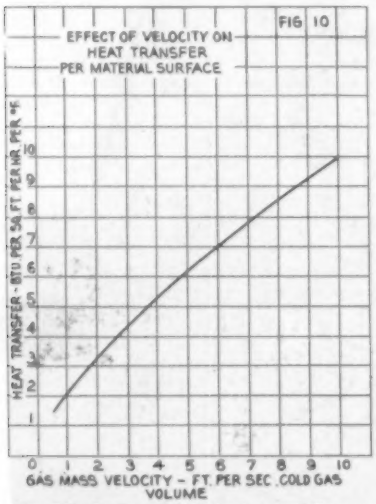
FIG 10
EFFECT OF VELOCITY ON HEAT TRANSFER PER MATERIAL SURFACE
HEAT TRANSFER - BTU PER SQ FT PER HR PER °F
GAS MASS VELOCITY - FT PER SEC COLD GAS VOLUME

Fig. 10: Curve, basing heat calculations on square foot of surface, to show effect of velocity on heat transfer

but for some other reasons undesirable. In any case it can be controlled.

Another advantage of heat transfer by radiation is that it reaches into the gas flow shadows, where gas velocity is low and convection heat transfer also is low. It makes all surfaces active which "see" the flaming

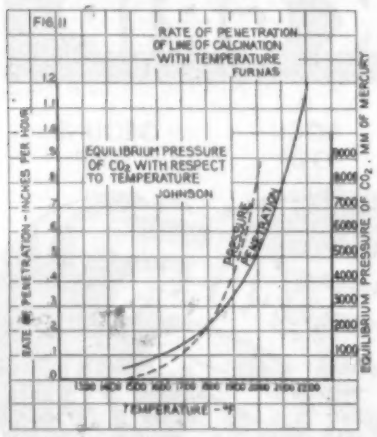
FIG 11
RATE OF PENETRATION OF LIME OF CALCINATION WITH TEMPERATURE FURNAS
EQUILIBRIUM PRESSURE OF CO2 WITH RESPECT TO TEMPERATURE JOHNSON
PRESSURE
PENETRATION
RATE OF PENETRATION - INCHES PER HOUR
EQUILIBRIUM PRESSURE OF CO2 - MM OF MERCURY
TEMPERATURE - °F

Fig. 11: Curves showing rate of travel of the line of calcination, and CO_2 vapor tension of dissociating lime

stream although same may not be flowing directly past them, and under such conditions only the completely shielded surfaces remain dead.

C. C. Furnas of the Bureau of Mines conducted some very interesting and exhaustive tests on heat transfer in beds of broken solids. He dealt mostly with problems related to Blast Furnaces, but they are also related to lime kilns.

His summarizing equation is given in the following:

$$K = \frac{AU^{0.7}\,T^{0.3}\,10^{1.68f}}{d^{0.9}} - {}^{3.68f^2}$$

U = Rate of flow in standard cubic feet per second per square foot of cross-sectional area of the bed.
T = Degree Fahrenheit absolute.
d = Particle diameter in feet.
f = Fractional value of voids in bed.
A = A constant for each substance.

It is important that the heat transfer varies as the 0.7 power of gas mass velocity. That this is so permits operating kilns at capacities per unit volume which, until a few years ago, were unsuspected. We can double to quadruple capacity of a given size kiln without impairing thermal efficiency and without increasing waste-gas temperatures, even when not increasing kiln height. This is partially because heat transfer increases 70 percent when mass flow doubles, as the latter would when kiln capacity doubles. It is not quite sufficient in itself to keep terminal waste-gas temperature from rising, but there are other compensating factors, such as a likely higher average flame temperature when operating kiln at a higher capacity, increased radiation, reduction of extent of the idle zone, previously mentioned, as well as a reduction in the proportionate amount of heat radiated from the kiln. The somewhat higher temperature which is likely, would result in increased heat transfer due to an increase in temperature, as well as increased heat transfer due to an increase of temperature difference. The same kiln making 30, 60, or 90 tons of lime will have about the same terminal temperature when other conditions are and remain normal.

The old kilns made about 500 lbs. of lime per sq. ft. of shaft area, the best of the new make 3000 lbs. That

(Continued on page 120)

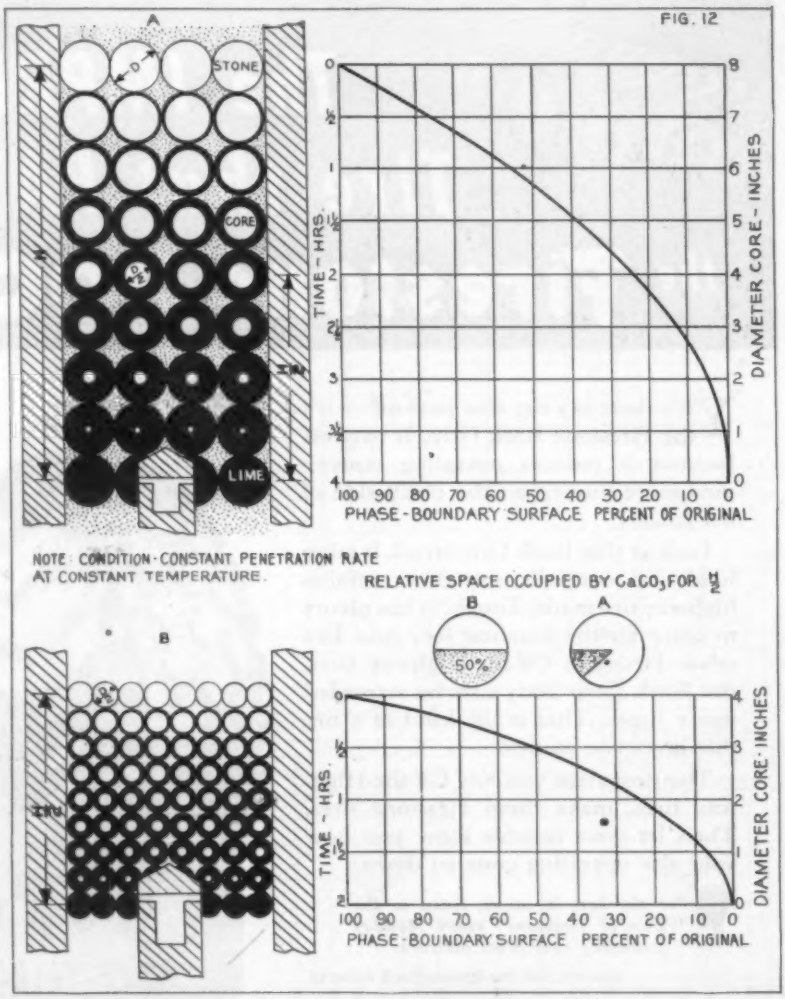

Fig. 12: Diagramatic sketches showing relation of stone size to height of calcining zone calcination time, and successive reduction of interface surface between core and lime

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INDUSTRIAL CONTROL

Surface Area Calculation with Special Slide Rules

By C. J. KNICKERBOCKER

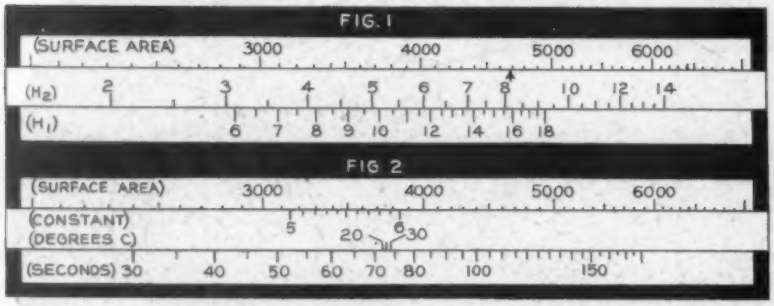

Fig. 1: Sliding scale graph that permits rapid approximate solution by substitution in Lea-Nurse equation, $S.A. = K(H_1/H_2)^{\frac{1}{2}}$. Fig. 2: Sliding scale graph solves equation, $S.A. = K(T/n)^{\frac{1}{2}}$, required in the Blaine U-tube method. (Scale one-half actual size)

CALCULATION of the surface area of cements tested by means of the Bowen Fineness Meter or Blaine U-tube is simplified when conducted graphically.

Fig. 1 is a sliding scale graph that allows a rapid approximate solution being made by substitution in the Lea-Nurse equation,

$$S.A. = K(H_1/H_2)^{\frac{1}{2}}$$

One value for K is sufficient when cement beds of constant porosity are used, therefore the arrow location on the slide may remain fixed. The H_1 and H_2 values (determined to 0.10) are aligned by moving the H_2 sliding scale and the surface area read on the upper stationary scale above the arrow on the slide.

The location of the arrow will depend upon the constant K in use and may be found readily by substitution of known H_1, H_2 and surface area values in the slide rule operation.

The determined surface area may be considered sufficiently accurate for hourly routine fineness control.

Fig. 2 is a sliding scale graph that solves the equation $S.A. = K(T/n)^{\frac{1}{2}}$, which is required in the Blaine U-tube method when the tests are conducted at variable temperatures and constant porosity.

Location of the constant to use on the slide is established by standardizing with Bureau of Standards Sample No. 114e or use of the theoretical value.

The recorded time T and the approximate temperature are aligned, the surface area being read above constant K on the slide. The surface area values shown are those as computed by means of the original Lea-Nurse equation.

Correct Low Lime Slurry

BELOW is illustrated a chart for rapid calculation in correcting a low lime slurry.

Required to correct 49.5 ft. of 44.9% CaO slurry to 61.5 ft. with a CaO of 44.2%, using a low CaO slurry, Fig. 4 is used.

$$\frac{49.5\ (44.9 - 44.2)}{(61.5 - 49.5)\ (44.2 - X)};$$

$$X = 2.9;\ CaO = 41.3\%$$

Using Fig. 4, align 49.5 on A with 0.7 on A', extending the line to cut R. Align this point and 120 on A, reading the required lime deficiency on A'. Differences may be determined with the chart in upper right hand corner.

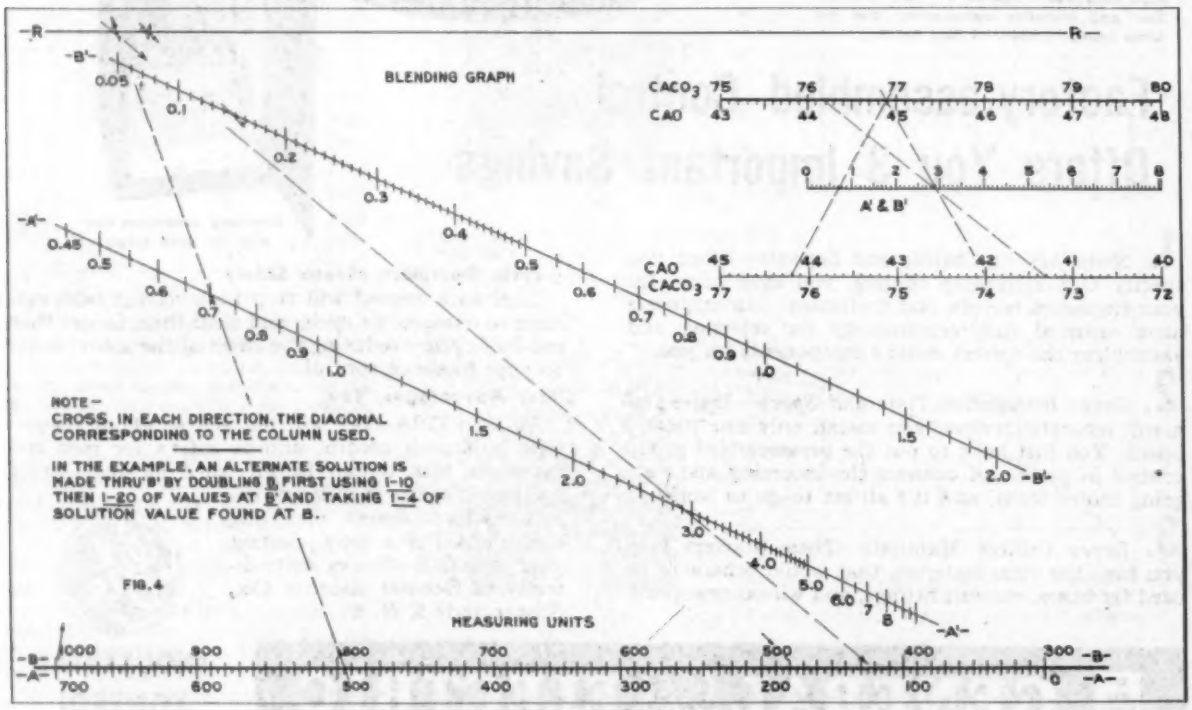
BLENDING GRAPH
CACO3
CAO
A' & B'
NOTE—
CROSS, IN EACH DIRECTION, THE DIAGONAL CORRESPONDING TO THE COLUMN USED.
IN THE EXAMPLE, AN ALTERNATE SOLUTION IS MADE THRU'B' BY DOUBLING B, FIRST USING 1-10 THEN 1-20 OF VALUES AT B' AND TAKING 1-4 OF SOLUTION VALUE FOUND AT B.
FIG. 4
MEASURING UNITS

Fig. 4. Blending graph employed for correcting a low lime slurry

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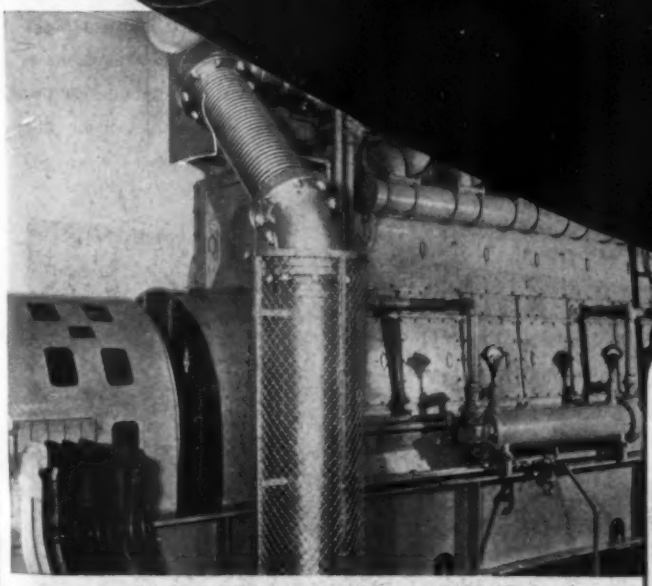

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Pennsylvania Stone Producers Meeting

On September 14, the Pennsylvania Stone Producers Association and the Agricultural Limestone Division held their business meetings and annual outing at the Harrisburg Sportsman's Club.

D. K. Shroyer of H. E. Millard Co., Annville, Penn., presided as chairman of the Agricultural Limestone Division meeting in the morning session. About 60 members and guests were in attendance. The chairman called on Dr. J. W. White, professor of soil technology, School of Agriculture, Pennsylvania State College who introduced Dr. H. K. Wilson, head of the Agronomy Department of Pennsylvania State College. Dr. Wilson briefly reviewed the work of his department as it related to the industry and invited all persons interested in the use of liming materials to call upon him for his assistance.

Dr. White outlined his work in the field of soil technology dating from 1905 to the present. He pointed out that the use of lime on the soils of the United States started about 1753. The commercial production of burnt lime was started in Mt. Joy, Lancaster county, Pennsylvania, in 1820, and only lime was used up to the year 1911 when the first raw ground limestone was distributed on Pennsylvania soils.

In the year 1924, there were 425,000 tons of raw ground limestone used in Pennsylvania. This dropped to a low of 321,000 tons in 1933 and in 1944, 1,300,000 tons were used in Pennsylvania. Dr. White stated that from the information which he developed at State College, the farmers of Pennsylvania could profitably use 2,000,000 tons per year. In his mind, there is no question as to whether the farmer can afford to use lime, but he doubts very much whether the farmer can afford not to use it.

"Commercial fertilizer without the application of lime is a fallacy," he said, "and when lime is applied, the crop value has been increased by many fold. Lime is the primer for the use of fertilizer." Dr. White also stated that the northern tier counties require the use of more liming materials than the southern counties of Pennsylvania.

Robert M. Koch, Field Service Branch of the A.A.A., Washington, D. C., discussed briefly the allocation of funds used for the purchase of liming materials for the farmers of Pennsylvania.

Clyde H. Zehner, State Director of the newly created Production and Marketing Administration of the United States Department of Agriculture, gave a brief talk on the distribution of A.A.A. funds, and, among other things, advised the group that seventy-six cents out of every Triple A dollar goes for the purchase of liming materials. He suggested that the agricultural liming materials producers and all others interested, should read the article in the September issue of the *Saturday Evening Post*, entitled, "Are We Starving to Death?" After reading it, he was convinced that there was little fear that we would use too much lime and raw ground limestone on our soils.

Stone Producers Meeting

A meeting of the Pennsylvania Stone Producers Association was called to order by President John Curtin, Sr., of the Warner Company, Bellefonte, Penn., immediately upon the adjournment of the Agricultural Limestone Division's meeting. There were 65 members and guests in attendance.

President Curtin called upon H. H. Wagner, general manager of the association, to discuss Pennsylvania Amendment Number 1 (known as the Good Roads Amendment) which will come before the electorate on November 6, 1945. This Amendment will assure the taxpayers that, in the future, all motor funds will be used for the construction, maintenance and safety of the highways in Pennsylvania.

Harry R. Hayes, secretary of the New York State Crushed Stone Association, extended an invitation to a joint meeting of the New York, Pennsylvania, New Jersey and New England states' crushed stone producers which will be held in the Hotel New Yorker on November 21, 1945. Harvey N. Clark, president of the New York State Crushed Stone Association, also extended an invitation to this meeting.

In spite of the threatening weather, the Pennsylvania Stone Producers' Annual Outing was well attended, with many of the guests playing in the golf tournament.

The following persons were in attendance:

Registration

Otho M. Graves, The General Crushed Stone Co., Easton.
Redington Moore, The General Crushed Stone Co., Easton.
John Rice, Jr., The General Crushed Stone Co., Easton.
R. J. Brubaker, Hummelstown.
H. H. Wagner, Penna. Stone Producers Ass'n., Harrisburg.
D. L. Mitchell, Hendrick Manufacturing Co., Hazleton.
Louise Malle, Harrisburg.
Claire Kranchalk, Harrisburg.
Phil Heim, The Carbon Limestone Co., Youngstown, O.
J. P. Peacock, Bethlehem Steel Company, Bethlehem.
Geo. E. Schaefer, The General Crushed Stone Co., Rochester, N. Y.
D. McM. Blackburn, Hendrick Manufacturing Co., Carbondale.
Trowbridge A. Warner, Hendrick Manufacturing Co., Carbondale.
H. P. Weaver, DuPont Company, Easton.
C. P. Teats, Rock Products, Chicago, Ill.
Hugh I. McIlwain, Bethlehem Steel Co., Bridgeport.
T. S. Ellington, Bethlehem Steel Co., Bridgeport.
D. K. Shroyer, H. E. Millard Company, Annville.
Henry A. Huschke, Agric. Limestone Div., National Crushed Stone Ass'n., Washington, D. C.
J. R. Boyd, National Crushed Stone Ass'n., Washington, D. C.
R. L. Fye, McLanahan & Stone Corp., Hollidaysburg.
J. Craig McLanahan, McLanahan & Stone Corp., Hollidaysburg.
Edwin T. Wolf, DuPont Co., Narberth.
Samuel K. Evans, DuPont Co., Glen Burnie, Md.
Shirley Aungst, Penn. Stone Producers Ass'n., Harrisburg.
Harold R. Kline, H. R. Kline Co., Wrightsville.
Chas. A. Frey, H. R. Kline Co., Wrightsville.
Clyde Orndorff, Bethlehem Steel Co., Hanover.
W. H. Litteer, General Crushed Stone Co., Easton.
E. E. Dotter, General Crushed Stone Co., Easton.
H. T. Yotter, General Crushed Stone Co., Easton.
H. D. Brigstocke, Thomasville Stone & Lime Co., Thomasville.
Wilmer A. Heyer, The Trumbower Co., Nazareth.
John Hoover, Nazareth Cement Co., Nazareth.

(Continued on page 134)

Part of the large crowd who attended outing

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International Red Diamond Engine. Heavy-duty power for heavy-duty work. Ample power and capacity—surprising economy. Proved in actual combat warfare, now available for civilian service.

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Out of this war has come, for example, the *new International Red Diamond Engine.*

Tens of thousands of International Military Trucks and Half-Tracks—powered by this new International Red Diamond Engine—have set new transportation and combat records in wartime service.

Many of these mighty Red Diamond Engines have already gone into International Heavy-Duty Trucks for essential civilian use. The men who operate them will vouch for the stamina and economy of adequate power for any job.

When new trucks roll out in volume on America's highways, look to International for even greater economy, even greater dependability. And remember—for ten years before the war *more heavy-duty Internationals were sold than any other make.* Backed then, as now, by the *world's largest company-owned truck service organization.*

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SERVICE: Many operators will have to wait for trucks. Maintenance of existing vehicles is just as important today as before V-J Day. Therefore—be sure your trucks get top care and service at International Truck Dealers and Branches.

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INTERNATIONAL Trucks

Surfaces for Vibrating Screens

Variety of Screening Media from Which to Select

By NATHAN C. ROCKWOOD

THERE STILL IS ONE variable in the operation of vibrating screens, referred to several times in this series of articles, which needs a bit of elaboration, because it can make a lot of difference in the efficiency of the screen and in the kind of product screened. This is the character of screening surface used. Testing sieves, for the finer sizes of aggregates, are square-mesh woven-wire cloth, but the commercial product to meet testing sieve size specifications may be screened through a variety of screen surfaces.

Standard Sieve Sizes

In order to assemble in one place the relation of standard sieve sizes of openings with commercial screen cloth openings we have taken the following table from Bulletin No. 514 of the W. S. Tyler Co.:

As has been pointed out before, the important sieves for the commercial sand producer are the Nos. 4, 8, 14 (Tyler) 16 (U. S.), 28 (Tyler), 30 (U. S.), 48 (Tyler), 50 (U. S.), and No. 100. It is from this series that the Fineness Modulus of concrete sand is determined.

When it comes to relation of size of openings to meshes of screen cloth used on vibrating screens we have the following W. S. Tyler Co. tables:

Other wire cloth manufacturers furnish similar tables, which are readily obtainable.

To compare the testing sieve mesh with screen cloth mesh, suppose we take 8-mesh as an example. The 8-mesh testing sieve has a cloth with 0.093-in. opening between wires. The

(Continued on page 114)

Opening Inch	WIRE DIAMETERS Medium Light Wire Diameter Inch	Medium Light Per Cent Open Area	Medium Wire Diameter Inch	Medium Per Cent Open Area	Medium Heavy Wire Diameter Inch	Medium Heavy Percent Open Area	Heavy Wire Diameter Inch	Heavy Percent Open Area
⅜	.135	54.1	.148	51.4	.162	48.7	.177	46.1
⅓	.120	52.2	.135	48.8	.148	46.0	.162	43.4
¼	.105	49.6	.120	45.6	.135	42.2	.148	39.4
⅕	.080	49.1	.092	45.1	.120	37.2	.135	33.8
⅛	.054	48.7	.072	40.2	.092	33.4	.105	29.5

Heavy wire recommended for trommels.
Medium heavy for high speed vibrating and shaking screens.
Medium light and medium for other vibrating screens.

Tyler Standard Screen Scale $\sqrt{2}$ or 1.414 Openings in Inches	For Closer Sizing Sieves from .0017" to 3.000" Ratio $\sqrt[4]{2}$ or 1.189	Opening in Millimeters	Mesh	Diameter of Wire, Decimal of an Inch	U. S. Series Equivalent Number
....	3	....	...	.207	...
....	2	....	...	.192	...
....	1½	....	...	.148	...
1.050	1.050	26.67	...	.148	...
....	.883	22.43	...	.135	...
.742	.742	18.85	...	.135	...
....	.624	15.85	...	.120	...
.525	.525	13.33	...	.105	...
....	.441	11.20	...	.105	...
.371	.371	9.423	...	.092	...
....	.312	7.925	2½	.088	...
.263	.263	6.680	3	.070	...
....	.221	5.613	3½	.065	...
.185	.185	4.699	4	.065	4
....	.156	3.962	5	.044	5
.131	.131	3.327	6	.036	6
....	.110	2.794	7	.0328	7
.093	.093	2.362	8	.032	8
....	.078	1.981	9	.033	10
.065	.065	1.651	10	.035	12
....	.055	1.397	12	.028	14
.046	.046	1.168	14	.025	16
....	.0390	.991	16	.0235	18
.0328	.0328	.833	20	.0172	20
....	.0276	.701	24	.0141	25
.0232	.0232	.589	28	.0125	30
....	.0195	.495	32	.0118	35
.0164	.0164	.417	35	.0122	40
....	.0138	.351	42	.0100	45
.0116	.0116	.295	48	.0092	50
....	.0097	.246	60	.0070	60
.0082	.0082	.208	65	.0072	70
....	.0069	.175	80	.0056	80
.0058	.0058	.147	100	.0042	100
....	.0049	.124	115	.0038	120
.0041	.0041	.104	150	.0026	140
....	.0035	.089	170	.0024	170
.0029	.0029	.074	200	.0021	200

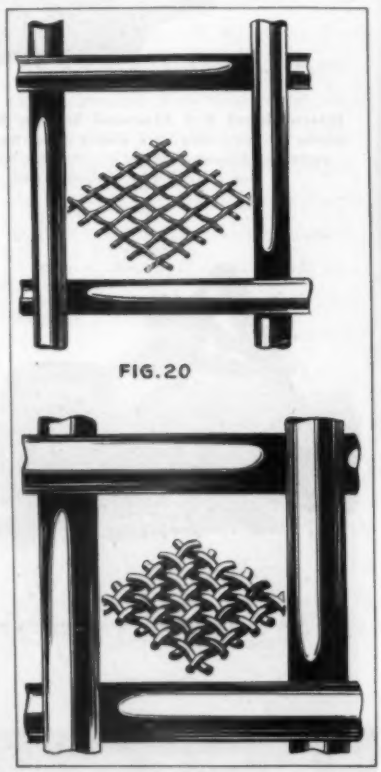

FIG. 20

Fig. 20. Two standard type weaves of wire screen cloth

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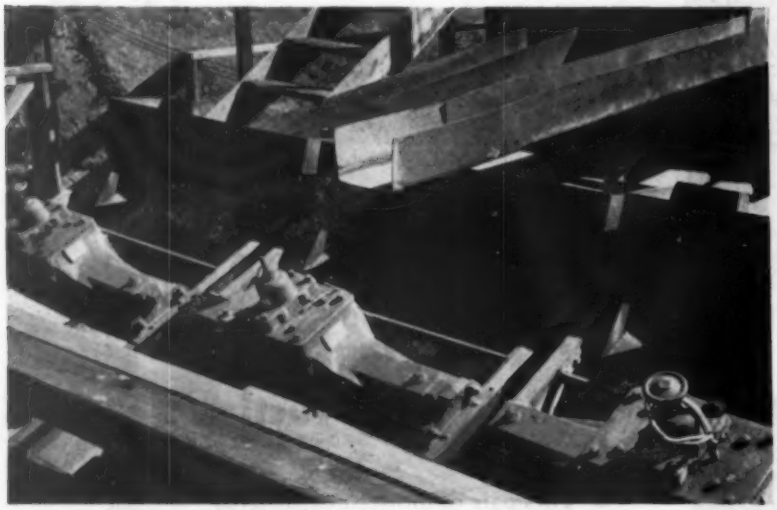

Vibrating screen installation for removing 60-mesh sand

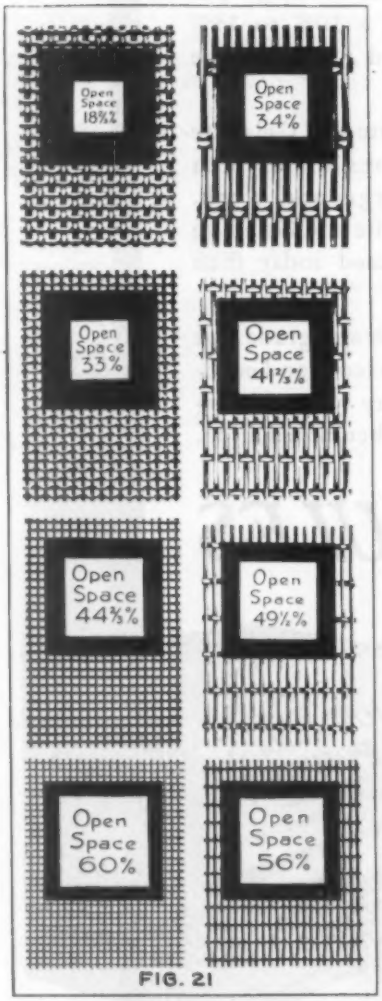

Fig. 21. Each of these screen cloths have the same nominal width of opening

8-mesh commercial screen cloth has an 0.084, an 0.078; or an 0.071-in. opening, depending on the size of wire used to make it. In the case of the No. 28 or 30 mesh, the sieve cloth has an 0.0232-in. opening and the commercial screen cloth an 0.0198-, 0.0183-, or an 0.0173-in. opening, depending on the size of the wire. This illustrates why the screen operator can not order screen cloth from the mesh-size specified on the basis of a set of testing sieves. An ⅛-in. opening is a 0.125-in. opening and would be nearer a No. 6 mesh testing sieve than a No. 8. Because heavier wire has to be used in screen cloth than in sieve cloth, a larger mesh has to be used to get the same sizes as specified by testing sieves, even if the screening surface is horizontal. If the screening surface is tilted at an angle of 45 deg., as is frequently the case in fine screening, the actual length of opening in a horizontal plane is the screen opening divided by the $\sqrt{2}$ (approximately 1.4) or say a ¾-in. screen opening would have a horizontal-plane opening of a little more than ½ in. If the slope of the screen is less than 45 deg., its effect on the screen opening of course is less.

The above comparisons are based on a particle falling vertically on the screen surface. Probably very few particles do fall vertically, for the rotation or vibration of the screen throws them forward as well as upward. So, while it is mathematically justifiable to lengthen the mesh openings in the direction of flow of material; however, this is not the only reason why rectangular or elongated-mesh screens often give much more satisfactory results than square-mesh. The most obvious reason, of course, is that there is a larger percentage of screen openings per square foot of screen surface.

Smooth or Rough?

Another question to be answered by the screen operator is whether the screening surface should best be smooth or rough. This one is tied up with nearly all the other variables thus far considered, for obviously the character of the material, the amount of moisture it contains, the slope of the screen, etc., etc., are involved. The smoothest screen surfaces are probably punched plates, which are obtainable in all kinds of perforations. Then there are bar screens, now made to screen the finest sizes, such as the new Hendrick "Wedge-Slot" screen. In wire screens, the simplest is the "piano wire" screen, which is made of parallel wires supported at intervals by cross ties, stretched lengthwise of the screen, with any spacing desired. These have large capacity on materials which permit not too accurate sizing. A similar screen surface is the "coil screen" of the Ludlow-Saylor Wire Co.

Woven wire screens, one might say, start with adding "fillers" (woven over-and-under cross wires) to the lengthwise parallel wires (warp) of the screen, to give strength and to

(Continued on page 116)

STANDARD SQUARE MESH WIRE SCREEN
5- TO 35-MESH

	LIGHT			MEDIUM			HEAVY		
Mesh	Wire Diameter Inch	Opening Inch	Per Cent Open Area	Wire Diameter Inch	Opening Inch	Per Cent Open Area	Wire Diameter Inch	Opening Inch	Per Cent Open Area
5	.063	.137	46.9	.080	.120	36.0	.092	.108	29.2
6	.054	.113	46.0	.063	.104	38.9	.072	.095	32.5
7	.047	.096	45.2	.054	.089	38.8	.063	.080	31.4
8	.041	.084	45.2	.047	.078	38.9	.054	.071	32.3
10	.032	.068	46.2	.035	.065	42.3	.047	.053	28.1
12	.028	.055	43.6	.032	.051	37.5	.041	.042	25.4
14	.025	.046	41.5	.028	.043	36.2	.035	.036	25.4
16	.023	.0395	39.9	.025	.0375	36.0	.032	.0305	23.8
18	.020	.0356	41.1	.023	.0326	34.4	.028	.0276	24.7
20	.018	.032	41.0	.020	.030	36.0	.025	.025	25.0
22	.017	.0285	39.3	.020	.0255	31.5	.023	.0225	24.5
24	.016	.0257	38.0	.018	.0237	32.4	.020	.0217	27.1
26	.015	.0245	37.3	.017	.0215	31.2	.018	.0205	28.4
28	.0135	.0222	38.6	.016	.0197	30.4	.017	.0187	27.4
30	.0135	.0198	35.3	.015	.0183	30.1	.016	.0173	26.9
32	.013	.0183	34.3	.014	.0173	30.6	.015	.0163	27.2
35	.011	.0176	37.9	.0135	.0151	27.9	.015	.0136	22.7

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This installation consists of two 24" conveyor belts, each 835 ft. long, running side by side on an incline. They are operating at one of the largest power producing plants in the Middle West. The installation was originally designed for an eight-hour day. Now, on account of the requirements of the war effort, the belts are being operated sixteen hours daily . . . and furthermore, the installation has been stepped up in belt speed about one-third.

All BWH conveyor belts are engineered and built to conform to certain definite conditions of speed, load and abrasion. Nevertheless, there is always present in BWH belts sufficient quality, stamina and inherent strength to pinch-hit on harder work if conditions demand, as is abundantly proven in this instance.

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Coast Metals Hard-Facing on the wearing parts enables crushers, drill bits, power shovels, feeders, tractor treads and other equipment to give such greatly increased service it will pay you to get further information. Write for Pamphlet No. R-301—yours for the asking.

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MAKE YOUR EQUIPMENT LAST LONGER

Sand Separation

(Continued from page 114)

wires. These are made in a variety of patterns with one, two or three cross wires, or in some cases, flat strips. The ratio of the length of the screen opening to its width may be anything desired. An operating advantage in using rectangular (oblong) mesh is that larger and stronger wire can be used for the same size screen opening and for the same percentage of screen openings per square foot. The smoothness of a woven-wire screen surface is affected by the kind of weave, that is a standard under and over weave, a crimped wire weave, and whether or not the screen cloth is "calendered" or rolled after weaving, which flattens the projecting wire loops, and hence makes a smoother screen surface.

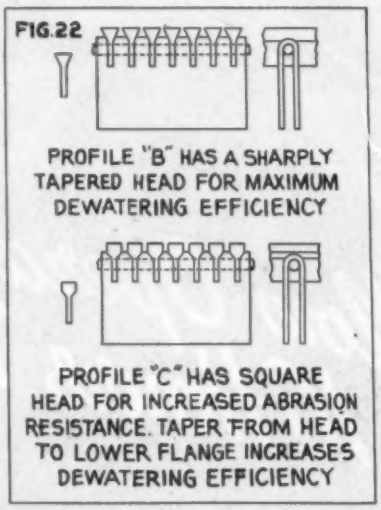
FIG.22
PROFILE "B" HAS A SHARPLY TAPERED HEAD FOR MAXIMUM DEWATERING EFFICIENCY
PROFILE "C" HAS SQUARE HEAD FOR INCREASED ABRASION RESISTANCE. TAPER FROM HEAD TO LOWER FLANGE INCREASES DEWATERING EFFICIENCY

Fig. 22. Two types of bar used in wedge-slotted screen

The Ludlow-Saylor Wire Co. publishes one of the most complete catalogs on wire cloth together with a great deal of helpful information for the screen operator in selection of his screening medium. Fig. 20 illustrates two standard weaves of this manufacturer's "Perfect" brand screen cloth. Fig. 21 from the same source illustrates how eight different screen cloths, that is different as to shape of opening and size of wire, all have the same nominal width of screen opening. The manufacturer warns, however, that the user must not expect *exactly identical* products from a long-slotted screen as from a square-mesh screen. The reason of course is obvious; the elongated mesh may let through lengthwise some nominally over-sized particles, especially if screening a slabby material.

In most installations the long-slotted screen is used with the long opening in the direction of the flow of the material; but this is not always the case for we recently saw an installation of Tyler "Hummer" screens for removing minus 60-mesh sand from concrete fine aggregate, on which the elongated mesh was cross-wise of the screen. The reason was that the material tended to go over the screen *too readily* with the elongated mesh lengthwise of the screen, and little removal of the fines was then accomplished. It is possible that similar results might have been accomplished by flattening the angle of inclination of the screen, but the angle for best all-around operation is usually determined by the screen manufacturer and should be adopted by the user unless there is ample reason for changing it.

Use Is Important

There is, as we have shown, in this series of articles, every reason why the vibrating screen operator should carefully study his problem and decide what he is actually trying to do with his screen. For example, the operation just described in the foregoing paragraph is dewatering, or in mining terms "desliming," rather than sizing. It could be used to give the final cleaning to a concrete sand with the assurance that not much of the really desirable finer sizes would be lost; but the clay and loam would be gotten rid of.

Another type of dewatering screen surface, not woven wire, has recently been announced by the Hendrick Manufacturing Co., known as the "Wedge-Slot" screen, already referred to. These screens are made of wedge-shaped-profile bars, held in position by U-shaped holders. The spacing betwen the slots may be made as narrow as desired. The bars are made in two cross-sections as shown in Fig. 22. An assembled screen surface is shown in Fig. 23. There are also available a variety of perforated plate screens, with which many special screening problems may be solved. For example, vibrating screens equipped on the upper half

(Continued on page 130)

Fig. 23. A new type of bar screen especially designed for dewatering and fine size separation

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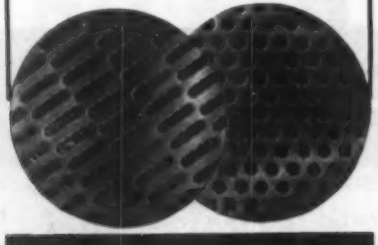

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Financing

(Continued from page 116)

arrangements made to combine the purchases into one obligation.

Smith & Co. agreed to pay off this amount over a period of 24 months. After making a down payment, the balance was to be divided into a series of monthly payments which automatically retired the advance within the two-year term.

In making these arrangements, the following simple procedure was followed: When Smith & Co. had selected the various items of equipment wanted, they sent the details of the purchase to the finance company. Included were the names of distributors, types of machinery, selling prices, terms and amount of down payments.

Incidentally, because Smith & Company had never done business with the finance company before, they sent along current facts and figures regarding their business so that a prompt credit decision was made. The finance company immediately prepared the necessary documents for signature and notified both buyer and seller that they were ready to handle the transaction.

As soon as the seller notified the finance company that the equipment was ready for delivery, a check covering the unpaid balance was sent them and the deal concluded without further detail.

Smith & Co. were able to put the equipment to work immediately and, again as in the case of Jones Production Co., the earning capacity of the machinery itself contributed materially to the liquidation of the advance. Note that here, too, working capital was left intact and a capital investment made readily possible through the use of outside funds.

While the names are of course fictitious, these factual illustrations of equipment financing are typical. The methods described can be applied to any similar problems whether the amount involved be small or large.

Manufacturers, distributors, producers and contractors in every industry make common use of these plans for amortizing machinery and equipment purchases. Actually, no rigid rules govern the extension of credit. The conditions surrounding each application are taken into consideration and, so far as is possible, a plan devised to fit every individual case.

A study of case histories consistently show one thing in common—the proved advantage of conserving working capital for operating purposes and the use, on extended terms, of outside capital for the acquisition of machinery, equipment and plant modernization.

There is no secret formula for obtaining additional capital. Any sound enterprise, small or large, can avail itself of the financial backing which spells the difference between struggling along on limited capital and going ahead with adequate funds behind their most ambitious plans.

In deciding on the type of financing best suited to the needs of the average company, experience has demonstrated that finance companies specializing in industrial financing, are in a position to work out a plan that, in its end result, will provide the most satisfactory service and impose fewer handicaps or restrictions on business management.

Solve Haulage Problem

VERMONT SAND AND GRAVEL CO., Bellows Falls, Vt., recently solved a haulage problem by the use of a Tournapull. The plant needed 75 cu. yd. of material per hour to maintain production, the material coming from a deposit under 18 to 24 in. of loam overburden in flat areas. As the haul had increased to 2300 ft. for the round trip, it was difficult to meet the plant requirements with a tractor and an 8-cu. yd. scraper. Because the ultimate extension of the deposit excavation would involve a 4000 ft. round trip haul, it was decided an extension of the conveyor system would be prohibitive in cost. It was therefore decided to use a Super C Tournapull which, pusher-loaded, delivers 11 cu. yd. per trip, and averages 11 trips per hour on the present 2300-ft. round trip haul, delivering 121 cu. yd. of material per hour to the plant. When the plant hopper is full, the Tournapull is used to strip overburden.

Oxychloride Cement

THE AMERICAN STANDARDS ASSOCIATION set up a committee on July 20 to develop specifications and methods of test for materials for oxychloride cement floors as well as specifications covering the installation of such floors. Technical leadership will come from American Society for Testing Materials and another organization not yet named. Oxychloride cement is used in public buildings, railroad station and railroad car floors as well as for ship decks. In the past improper installations have resulted in excessive wear, a condition which the Association hopes to correct.

Canadian Gypsum Development

WORK is well under way for the development of a large gypsum deposit by Western Gypsum Products, Ltd., at Mayook, near Cranbrook, B. C. Rock will be shipped to the plant at Calgary for the manufacture of wallboard and other products.

To Build Haydite Plant

THE CARTER-WATERS CORPORATION, Kansas City, Mo., plans to open a quarry and Haydite plant at 102nd street and U. S. Highway 71.

From a St. Regis advertisement — 1939

"The Finest Industrial Peacetime Package"

From a St. Regis advertisement — 1942

Essential *Wartime*

"The ~~Finest~~ Industrial ~~Peacetime~~ Package"

AND NOW: 1945

Improved *Peacetime*

~~Essential~~ ~~Wartime~~

The ~~Finest~~ Industrial ~~Peacetime~~ Package

DURING the past few years, the St. Regis Paper Company has geared its bag production to serve wartime needs.

To this end, a new bag plant was erected in Kansas City. Substantial additions were made to our other bag plants throughout the country.

The company's laboratories and testing facilities developed new grades of paper and improved bag construction to cope with the hazards of wartime shipping and storage.

Today, as industry returns to a free, peace-time economy, St. Regis augmented production facilities and the technical developments of recent years are available to American industry for the packaging of many types of food, as well as construction, agricultural, and chemical commodities.

We are confident that St. Regis packing machines together with improved Multiwall valve and open-mouth paper bags will keep pace with the increased tempo that will characterize American progress in the years that lie before us.

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Worthington-Ransome Blue Brute Distributors

By referring to the advertisement on page 121, you'll learn the meaning of the (1), (2) or (1-2) beside their names.

Ala., Birmingham (1) J. D. Pittman Tractor Co.
Ariz., Phoenix (2) Smith Booth Usher Co.
Ark., Fort Smith (2) R. A. Young & Son
Little Rock (1) Kern-Limerick, Inc.
Little Rock (2) R. A. Young & Son
Calif., Los Angeles (1) Garlinghouse Bros.
Los Angeles (1-2) Smith Booth Usher Co.
San Francisco (2) Coast Equipment Co.
Colo., Denver (2) John N. Meade
Denver (1-2) Power Equipment Co.
Conn., Hartford (2) The Holmes-Talcott Co.
New Haven (1) W. I. Clark
Waterbury (1) Contractors Supply Co.
D. C., Washington (1) M. A. Doetsch Machy. Co.
Fla., Miami (1-2) Allied Equipment, Inc.
Tampa (2) S. M. Regar
Ga., Atlanta (1-2) Tractor & Machinery Co.
Savannah (1) Morgans, Inc.
Ida., Boise (1-2) Olson Manufacturing Co.
Ill., Chicago (1-2) Chicago Const. Equipment Co.
Chicago (2) John A. Roche
Chicago (1) Thomas Hicks Co.
Ind., Fort Wayne (1) American Steel Supply Co.
Indianapolis (2) Reid-Holcomb Co.
Iowa, Des Moines (2) Electric Eng. & Const. Co.
Ky., Harlan (2) Hall Equipment Sales Co.
Louisville (2) T. C. Coleman & Son
Louisville (2) Williams Tractor Co.
Paducah (1) Henry A. Petter Supply Co.
La., New Orleans (1) Ole K. Olson Co.
New Orleans (2) Wm. F. Surgi Equipment Co.
Maine, Portland (1-2) Maine Truck-Tractor Co.
Md., Baltimore (1) Stuart M. Christhilf & Co.
Baltimore (2) D. C. Elphinstone, Inc.
Mass., Boston, Allston (1-2) Clark-Wilcox Co.
Cambridge (2), W. W. Field & Son, Inc.
Mich., Detroit (1), T. G. Abrams
Detroit (2) W. H. Anderson Co., Inc.
Dearborn (2), T. G. Abrams
Flint (2) Gransden-Hall & Co.
Muskegon (1-2) Lakeshore Machy. & Sup. Co.
Minn., Minneapolis (1-2) Phillippi-Murphy Equipment Co.
St. Paul (2) D. L. O'Brien
Miss., Jackson (1) Jackson Road Equipment Co.
Mo., Clayton (1-2) The Howard Corporation
Kansas City (1) Brown-Strauss Corp.
Kansas City (2) Machinery & Supplies Co.
St. Louis (2) W. H. Reaves
Neb., Lincoln (1) Highway Equipment & Supply Co.
N. J., Hillside (2) P. A. Drobach
Newark (1) Johnson & Dealaman
North Bergen (2) American Air Compressor Corp.
N. M., Albuquerque (2) Bud Fisher Co.
Albuquerque (1) Morrow & Co.
Roswell (2) Smith Machinery Co.
N. Y., Albany (1-2) Milton-Hale Machinery Co.
Buffalo (2) Dow & Co., Inc.
New York (2) Air Compressor Rental & Sales
New York (1-2) Hodge & Hammond, Inc.
New York (1-2) Railroad Materials Corporation
Olean (2) Freeborn Equipment Co.
N. C., Raleigh (2) Carolina Tractor & Equipment Co.
Raleigh (1) Smith Equipment Co.
N. D., Fargo (1-2) Smith Commercial Body Works, Inc.
O., Cincinnati (2) Finn Equipment Co.
Cleveland (2) S. M. Clancey
Cleveland (1) H. B. Fuller Equipment Co.
Cleveland (2) Gibson-Stewart Co.
Marietta (2) Northwest Supply & Equipment Co.
Toledo (2) M. W. Kilcorse & Co.
Okla., Oklahoma City (2) Townsco Equipment Co.
Oregon, Portland (2) Andrews Equipment Service
Pa., Allentown (2) H. N. Crowder, Jr., Inc.
Easton (2) Sears & Bowers
Oil City (2) Freeborn Equipment Co.
Philadelphia (1) Giles & Ransome
Philadelphia (2) Metalweld, Inc.
Pittsburgh (2) Atlas Equipment Corp.
Wilkes-Barre (2) Ensminger & Co.
Wilkinsburg (1) Arrow Supply Co.
S. C., Columbia (1-2) Smith Equipment Co.
Tenn., Knoxville (2) Wilson-Weesner-Wilkinson
Memphis (2) Tri-State Equipment Co.
Tex., Dallas (1) Service Equipment Co.
Dallas (2) Shaw Equipment Co.
El Paso (2) Equipment Supply Co.
El Paso (1) Mine and Smelter Supply Co.
Houston (2) Dye Welding Supply Co.
Houston (1) McCall Tractor & Equipment Co.
San Antonio (2) Patten Machinery Co.
San Antonio (1) San Antonio Machine & Supply Co.
Utah, Salt Lake City (1-2) Landes Engineering Co.
Vt., Barre (1-2) A. M. Flanders, Inc.
Va., Richmond (1-2) Highway Machinery & Supply Co.
Wash., Seattle (2) Star Machinery Co.
Spokane (2) Andrews Equipment Service
W. Va., Charleston (1) West Virginia Co.
Fairmont (2) Interstate Engineers & Constr., Inc.
Wisc., Milwaukee (1) Mekeel Engineering Co.
Wyoming, Cheyenne (2) Wilson Equipment & Supply Co.

Blue Brute Boosters

Worthington Pump and Machinery Corp.

Worthington-Ransome Construction Equipment Division

Holyoke, Massachusetts

Quality Lime Manufacture

(Continued from page 106)

they do not make two tons of lime per sq. ft. is not a matter of heat transfer but of draft, as draft quadruples for every doubling of capacity and power rises eight times. Two tons of lime per sq. ft. of shaft area draft would be prohibitively high only under present development which may change if kilns become further improved.

Heat transfer rate per degree difference varies as the 0.3 power of absolute temperature. Temperature has some effect on convection transfer but not much and certainly not nearly as much as on transfer by radiation. In any case, however, it contributes towards maintaining heat absorption rate in step with kiln capacity.

Surprisingly, when the size reduces, heat transfer rate reduces slightly. One would expect the opposite. While halving the size doubles the surface, this surface will have only 90 percent of the heat transfer per sq. ft. of heating surface of the larger stone, but it will be 180 percent per cubic foot.

Due to the difficulty of correctly estimating cross-sectional area of the bed available to gas flow to determine velocity, and also the difficulty of estimating surface active in absorbing heat, Furnas based his work on rate of flow per square foot of the entire bed cross-section and heat transfer rate on cubical content of the bed. Fig. 9 was devised in accordance with his system.

It is impossible, of course, to show all of the heat transfer factors on one chart, but the most important are velocity of the gas and stone size, which are given, adjusted to results obtained from an actual kiln operating under medium favorable conditions.

We therefore have the choice of using this chart, basing it all on a cubic foot of kiln space or using surface data previously given and basing it on heat transfer per square foot surface, or both. This we do in Table 12 applied to the Beachville kiln. When using both, results may not be the same, but the discrepancies may create a better insight into the state of the lime kiln bed in regard to surface active or inactive, voids open or clogged, idle kiln space, etc.

When basing heat calculations on a square foot of surface basis, Fig. 10 should be used, which gives *K* per square foot at the different gas velocities.

Heat Penetration

The rate of heating stone or lime depends first on surface conductivity, discussed previously, and secondly on thermal diffusivity. Under the first, heat is transferred to the surface by convection and radiation, and under the second, thermal diffusivity, the rate depends upon conductivity, density, heat capacity and temperature difference. As stone has one density and a higher conductivity than lime and the boundary of the two changes continually, the problem is complicated and therefore the rate of calcination tables or various investigators are not even in approximate agreement. Even C. C. Furnas' data is not borne out in practice, but in spite of that he contributed more to this subject than anyone else and was instrumental in greatly simplifying it. During his investigations at the U. S. Bureau of Mines, he came to the rather interesting and important conclusion that:

"The line of calcination advances at a constant linear rate, dependent only on the temperature of surroundings and independent of size or shape of piece, degree of calcination or amount of previous heating."

The rate of travel of the line of calcination as determined by Furnas is one inch per hour at 2150 deg. F., and for other temperatures will vary as follows: (The rates are also plotted in Fig. 11 together with the curve of CO_2 vapor tension of dissociating lime, which seems to be the driving force.)

Temperature of Surroundings	1500	1600	1700	1800	1900	2000	2100	2200
Penetration line of calcination, In. per hr...	.07	.11	.16	.24	.34	.54	.82	1.23

According to this, a 4-in. stone fully exposed would calcine completely in two hours' time, if temperature was 2150 deg. F., which is by no means a high temperature.

Tests were made by the author in the unusual manner of suspending limestone from a scale so a complete history, not only of furnace temperature, of surface temperature, of internal temperature of the calcining sample, but also of its weight and weight change rate, would be continuously recorded, and the results as a whole follow rather closely Furnas' results, but all surface of the sample must be exposed to the flowing gases which is far from being the case in any kiln.

Furnas himself points out the relatively small amount of surface (20 percent) that is active in the kiln, when conditions are favorable, and it is this surface which functions in the above manner only.

On the basis of equal volumes, a sphere has the least surface and requires the longest time to completely calcine, while thin slabs have the most and therefore are calcined in the shortest length of time.

No kiln charge is of spherical shaped stone; all of it is more or less irregular and from the ranges of size

(Continued on page 122)

BETTER CONCRETE IN BIG BATCHES AT LOWER COST

If you have your sights set on some of those big construction jobs that loom over the horizon, you'll want to investigate Ransome Blue Brute "Big" Mixers.

Look at their record: Ransome built the first "big" mixer back in 1902 for the U.S. Navy Dept. . . . has pioneered all major improvements ever since. Used for some of the world's outstanding construction projects they are first choice too, for central mix operators. A Blue Brute 126-S Mixer owned by Arundel-Brooks Corp. of Baltimore has mixed more than 2,000,000 yards and is still going strong.

Look at their features: Ransome's exclusive mixing action . . . fast, thorough . . . result of 96 years' mixing experience; spiral cut-off water tank and non-by-passing poppet valves . . . for the accurate water measuring that central mixing plants demand; hydraulically-operated discharge chute . . . simple, compact, trouble-free; car-wheel metal drum rollers and true-circle machined-tracks . . . for maintained accurate alignment of drum with driving mechanism.

Check these and the many other features that make Blue Brute "Big" Mixers your best bet for making better concrete at lower cost.

AD. 13

KNOW YOUR BLUE BRUTES

Your Blue Brute Distributor will gladly show you how Worthington-Ransome Blue Brute construction equipment will put your planning on a profitable basis and prove that *there's more worth in Worthington.* Act now! His name is listed on page 120. The number beside his name indicates the Blue Brutes he carries.

1.
Blue Brutes include: Pavers, Concrete Spreaders**, Concrete Mixers, Concrete Placing Equipment, Big Mixers, Finishing Machines**, Pneumatic Placing & Grouting Equipment, Truck Mixers, Plaster & Bituminous Mixers, and related equipment.

2.
Blue Brutes also include: Diesel, gasoline and electric driven Portable Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs; Rock Drills and Air Tools in a wide range of weights and sizes; Contractors' Pumps.**

**Proposed Products

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Truck Mixers
Capacities:
2, 3, 4½, 5½ cu. yds.

Portable Mixers
Capacities:
3½, 7, 10, 14 cu. ft.

Big Stationary Mixers
Capacities:
28, 56, 84, 126 cu. ft.

Pneumatic Placer
Capacity:
7, 14, 28 cu. ft.

WORTHINGTON

Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division
Holyoke, Mass.

2 essential safety products
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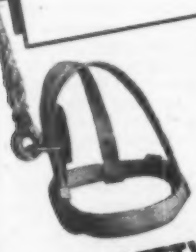
Skullgards lead in comfort, safety and all-around fitness for the rock products worker on the job. Unique in construction and light in weight, Skullgards are exclusively high-pressure molded of laminated bakelite—with tremendous resistance to fracture from falling objects, blows and bumps, yet easy on the head as an old felt hat!



M·S·A SAFETY BELTS

M.S.A. Safety Belts are sturdy and dependable, designed for maximum working freedom. The lifeline is entirely out of the workman's way. In case of a slip or fall, the belt grips the wearer around the chest—not up under his arms. Light, flexible, strong, with tested hardware and construction.

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MINE SAFETY APPLIANCES CO.
BRADDOCK, THOMAS AND MEADE STS.
PITTSBURGH 8, PA.
District Representatives in Principal Cities

Lime Manufacture

(Continued from page 104)

we are safe to assume that ordinarily when stone is not unusually slabby, the surface will be 25 percent more than that of a sphere of equal weight, and comparative depth of penetration of calcination zone will be only about 65 percent of a round specimen, which is the same as 65 percent of calcination time at any given temperature; if exposed fully of course.

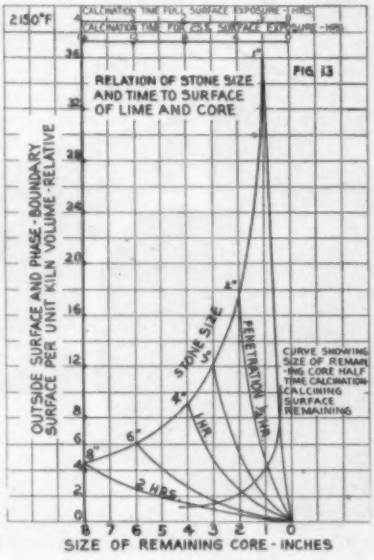
2150°F
CALCINATION TIME FULL SURFACE EXPOSURE - HRS.
CALCINATION TIME FOR 25% SURFACE EXPOSURE - HRS.
FIG. 13
RELATION OF STONE SIZE AND TIME TO SURFACE OF LIME AND CORE
OUTSIDE SURFACE AND PHASE - BOUNDARY SURFACE PER UNIT KILN VOLUME - RELATIVE
STONE SIZE
PENETRATION RATE
CURVE SHOWING SIZE OF REMAINING CORE HALF TIME CALCINATION CALCINING SURFACE REMAINING
2"
4"
6"
8"
1 HR.
2 HRS.
SIZE OF REMAINING CORE - INCHES

Fig. 13: Curve indicates that a kiln calcining 4-in. stone will have four times the output of one calcining 8-in. stone, if surrounding temperature and gas flow rate are the same

It is now possible for us to deduce that it requires as much time to calcine a 4-in. core as it requires for a 4-in. piece of stone. But a 4-in. core is in weight only 12.5 percent of an 8-in. stone, for the calcination of which the heat is gathered by the surface of the 8-in. lump. So for calcination of the last 12.5 percent, half of the calcination time is required and four times the surface.

In the lower portion of the hot zone, where core is calcined out of the 8-in. assumed lumps, the work done is only one-eighth of that possible if 4-in. stone would be completely calcined, which is even a better argument for small stone than any we previously developed.

While the rate of calcination for larger as well as small particles is the same for either large or small stone in terms of phase boundary progression, the efficiency of space utilization is eight times greater with stone of half size.

A 4-in. core has an 8-in. lump surface gathering heat and that represents four times the surface. So it requires four times the surface effort for 4-in. core than it would for 4-in. stone, and this, interpreted into kiln volumes, makes a big difference. It means simply that a kiln of half size stone can have a capacity four times as great; four times as much lime from a kiln of 4-in. stone, than from 8-in. stone; and 16 times as much when stone is only of 2-in. size, provided heat is brought to the surface.

Effect of Chemical Composition and of Microstructure

Stone analysis and even stone microstructure are factors not so much on account of heat conductivity; that is, rate of heat in-flow, as on account of resistance to gas out-flow. Dolomite and its calcining behaviour demonstrates this very well. When its magnesium carbonate portion dissociates, the exuding CO_2 has available only about one-half the out-flow area and so has different dissociation rates, depending on the rate of dissociation taking place. When the calcination rate is very slow, dissociation temperature will be that of pure magnesium carbonate; at faster rates it will be higher; at very fast rates by several hundred degrees higher, the difference being due to the higher pressure necessary by the out-flowing gas to overcome the resistance to its out-flow.

The same is true with high calcium, but to a lesser extent, because CO_2 has about twice the area available for its outflow but even here there is resistance, particularly at higher rates and temperatures, partially due to speed of the gas and to constriction of passages brought on by the shrinkage of lime at the higher temperature. It is this which most likely is responsible for the penetration rate which does not rise at the same rate as the CO_2 vapor pressure presented in Fig. 11.

The limestone does not need to have much magnesium carbonate to open its structure and permit more

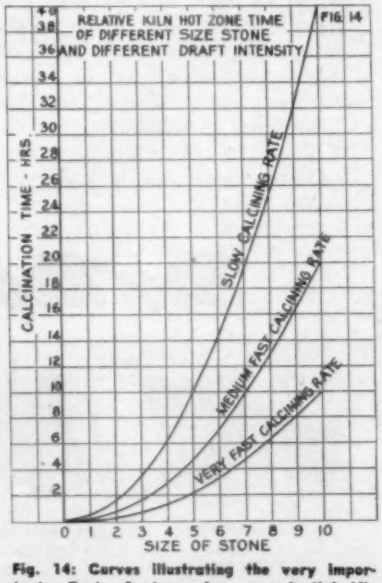
RELATIVE KILN HOT ZONE TIME OF DIFFERENT SIZE STONE AND DIFFERENT DRAFT INTENSITY
FIG. 14
CALCINATION TIME - HRS.
SLOW CALCINING RATE
MEDIUM FAST CALCINING RATE
VERY FAST CALCINING RATE
SIZE OF STONE

Fig. 14: Curves illustrating the very important effect of stone size on potential kiln capacity

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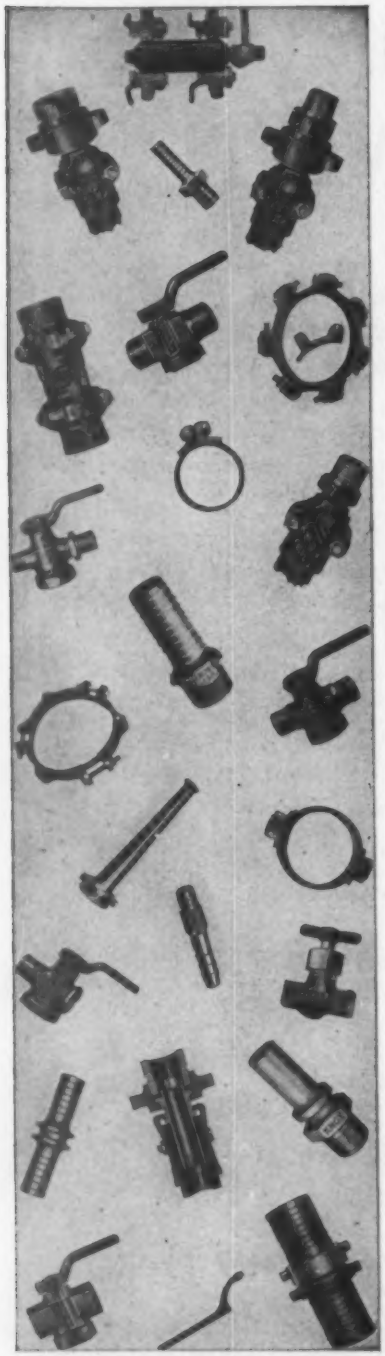

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(Continued from page 122)

ready escape of CO_2 from the $CaCO_3$ resulting in quicker calcination. A stone of apparent low gravity will also be open and should calcine faster, although this often is hidden by the fact that such stone ordinarily tends to crumble, blocking the kiln gas flow passages, and on this account tending to give a lower rather than a higher kiln capacity.

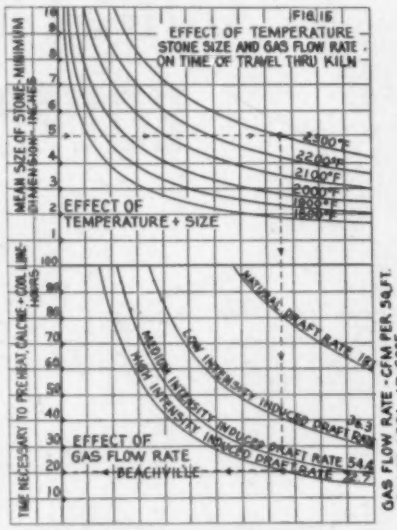


FIG. 15
EFFECT OF TEMPERATURE STONE SIZE AND GAS FLOW RATE ON TIME OF TRAVEL THRU KILN
MEAN SIZE OF STONE - MINIMUM DIAMETER STONE INCLUDED
2300°F
2200°F
2100°F
2000°F
1900°F
1800°F
EFFECT OF TEMPERATURE + SIZE
NATURAL DRAFT RATE 19
LOW INTENSITY INDUCED DRAFT RATE
MEDIUM INTENSITY INDUCED DRAFT RATE
HIGH INTENSITY INDUCED DRAFT RATE 54.4
36.3
27.7
EFFECT OF GAS FLOW RATE + BEACHVILLE
TIME NECESSARY TO PREHEAT CALCIE + CON. LIME HOURS
GAS FLOW RATE - CFM PER SQ.FT. SHAFT AREA AT 60°F

Fig. 15: Chart to determine kiln capacity for any stone size, kiln temperature and draft condition, provided stone quality and packing conditions remain the same

Rate of calcination is a matter of temperature and amount of surface; the higher the temperature of the gases and the more surface the stone presents, the more heat will be absorbed by a given volume of stone.

The surface that does count in this respect is not the outer surface which gathers the heat, but rather the projected surface of the boundary layer of lime and limestone.

When the 8-in. lime-rock lump is reduced to 4-in. core there will still be the original outer heat gathering surface but the calcining surface will be reduced to only one-fourth the original area and the weight of stone remaining will be only one-eighth.

For purposes of calcining one-eighth the original weight, four times the calcining surface and eight times the heat gathering surface is required.

While it seems that stone calcination time varies inversely as its size, that is 4-in. stone requiring half the time needed for 8-in., this would be strictly true only when calcining takes place in say, an electric laboratory furnace, where volume occupied by the lime is not a factor.

When stone is calcined in a vertical kiln of limited and therefore valuable dimensional volume, due to great external heat-gathering surface necessary to calcine a relatively small volume core, much of the valuable space is uselessly occupied by the already burned, heat flow-resisting, lime. Fig. 12 shows this to be much more serious with large than with small stone.

Fig. 13 shows that while 8-in. stone will have initially half the calcining surface of 4-in. stone per unit of kiln volume, its 4-in. core will have only one-eighth, and since it is this surface that counts, and of which there will be four times as much with any stone of half size, therefore the possible calcination rate is four times as great. A kiln having 4-in. stone will have four times the output than with 8-in. stone, if surrounding temperature and gas flow rate throughout are the same in both cases.

Fig. 14 shows the very great effect of stone size on possible kiln capacity. In practice this great difference is never noticed due to failure to understand the matter and inability to adjust conditions to the point permitting the small stone to reveal its advantages.

With small stone usually either column height or draft are wrong as well as gas distribution. With this not properly taken care of, results always are worse instead of better.

While draft is a factor, it is only due to improper column height otherwise it would not need to be because while calcination rate raises fourfold, column height reduces to one-fourth and so draft remains the same. It only varies when the output per square foot of shaft area varies.

Summarizing, we may say that "Kiln time for preheating of stone, calcining it to lime and cooling lime is a matter of thickness of stone, degree of its exposure to flowing gases, and mass velocity of the gas stream and its temperature."

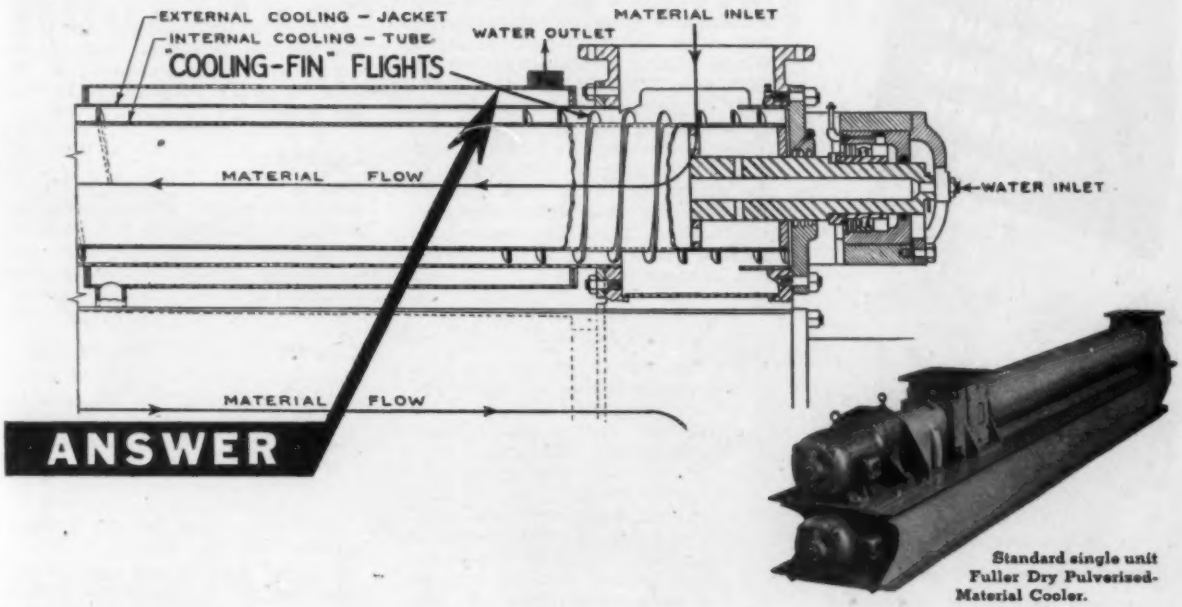
For any stone *"The rate will vary inversely as the square of stone thickness, directly with the gas mass velocity and as the peneration rate for the particular gas temperature."*

Taking the Beachville kiln operating at high draft intensity as a standard, conditions are as follows:

Capacity Per Day Tons	Gas Flow Rate Cu. Ft./Min./ Sq. Ft.	Kiln Time Hours	Hot Zone Temperature	Lime Penetration Rate In./Hr.	Stone Size In.	Surface Exposure %
80	72.5	20	2300	1.7	5"	20%
For natural draft condition would be:						
20	18.1	80	2300	1.7	5"	20%

From this is drawn a very unusual chart, Fig. 15, which is the first of its kind that embraces all of the above conditions.

The $64.00 Question . . .
Why Do Fuller Coolers Really Cool?



Standard single unit Fuller Dry Pulverized-Material Cooler.

Write for Bulletin PMC-1

The water-cooled screw which carries the material, the flights of which are specially welded to a hollow shaft, is designed on the same principle as the so-called "fin-tube", so successfully used by the refrigeration industry for efficient and rapid transfer of heat.

With this design and construction approximately 75 per cent of the heat extracted is carried off by the water circulated through the relatively large hollow screw shaft. The outer water jacket provides the remaining heat extraction.

These units are totally enclosed and dustless. The compact and rugged design makes for easy installation with minimum head room and support requirements.

FULLER COMPANY

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FULLER COMPANY

FULLER-KINYON, FULLER-FLUXO AND THE AIRVEYOR CONVEYING SYSTEMS . . . ROTARY FEEDERS AND DISCHARGE GATES . . . ROTARY AIR COMPRESSORS AND VACUUM PUMPS . . . AIR-QUENCHING INCLINED-GRATE COOLERS . . . DRY PULVERIZED-MATERIAL COOLER . . . AERATION UNITS . . . MATERIAL-LEVEL INDICATORS . . . MOTION SAFETY SWITCH . . . SLURRY VALVES . . . SAMPLERS

PMC-11

Johnson Engineers are ready to assist you in designing and building a ready-mix plant that fits the actual needs of your market—one that will produce the bigger profits *at a minimum investment.* Johnson equipment can be expanded economically as your sales grow.

Specific recommendations, and an individual plant layout—featuring Johnson's famous Concentric batcher that delivers scientifically batched material *economically*—as you need it, are yours for the asking.

This service, of course, is without obligation.

As the first step—write today for details.

THE C. S. JOHNSON COMPANY
Champaign, Illinois
A Koehring Subsidiary

Batching Ready Mix

(Continued from page 75)

gate for bulk sales without interfering with ready-mixed concrete batching; (2) the assurance of wetting aggregate thoroughly before cement is added; (3) cleaner operation than when water comes in with the cement, making it easy to keep down dusting and splashing around spouts and mixer openings; and (4) better Winter mixing control, in preventing flash set. There is also the possibility, though rare, of forming balled-up cement in the mixer, when dry cement and water are added side by side, a phenomenon characteristic of the action between a very fine dry powder and a locally insufficient supply of water. The balls require mixing time out of all proportion to their bulk to break them up.

Arrangements for Special Cements

The two cement storage bins with their separate screws to the 40-cu. ft. batcher makes it possible to keep two kinds of cement always ready for immediate use. With this plant, the arrangement is particularly useful during the season when contracts for street and road paving are large. One bin will then carry air-entrained cement exclusively while the other will carry regular portland cement for the non-paving trade. A two push-button control mounted on the panel at the cement scales makes the choice available instantaneously. A DeVilbiss air compressor aerates the cement in the bins to facilitate free flow.

A small auxiliary cement hopper, used for bag-batching, accommodates the infrequent and smaller orders calling for quick-setting, high-early, acid-resistant, and other special cements. A belt conveyor transfers the bags from truck to batching floor.

Built for Cold Weather

The whole plant structure is built for permanence and cold weather working comfort. All electrical wiring is in conduit with all switches mounted on one panel, on the batching floor, within easy reach of the man doing the batching. The batching floor has more than the usual amount of free floor space, and windows overlook the grounds where the trucks operate. As mentioned before, the boot of the elevator and the feeder to the boot are protected from the elements, as is the elevator head with its drive. Not only are all areas of maintenance protected, but the space within the housings are large enough so that delays in making repairs, caused by wet, dark and cramped quarters, are minimized.

A modern low pressure boiler will be installed in the near future for heating water and aggregate in Winter. Auxilliary equipment will be a supercharger, and a 500-gal. water tank.

W. G. Block Co. operates three plants in the quad-city area, and has a mixer fleet of 18 trucks, all available at one plant if necessary. Permanently attached to this new Davenport plant are four 3-cu. yd. and three 2-cu. yd. Hi-Discharge Rex mixers, mounted on K-7 International trucks equipped with Thornton drives.

Officers of the company are C. A. Mainwaring, president and J. R. Worthington, vice-president. B. W. Mainwaring is manager of the Davenport plant.

Agstone

(Continued from page 94)

and undigestible. These facts all point out that we do not want to use limestone to get rid of all the soil acidity, but we want it to provide calcium that makes our foods and feeds serve us better.

Liming Practice Progressing

Immediately you will be raising the question whether or not the agricultural practice of liming is attended by the danger of overliming. Of course, there is always danger in using anything under the general belief that "if a little is good, more will be better." This holds, too, for putting limestone on the land.

However, most of the soils in the higher rainfall regions of the United States have been so depleted of their calcium that they will take considerable limestone before the sins of past neglect, in this respect, will be washed away. The amount of lime going on the land, in general, is far short of the needs as shown so definitely in the data collected by C. E. Carter of the Agricultural Conservation Programs Branch, Food Production Administration. But there may be single fields or farms in danger of being given too much lime, particularly if liming is the only soil treatment used, and the soils are more sandy.

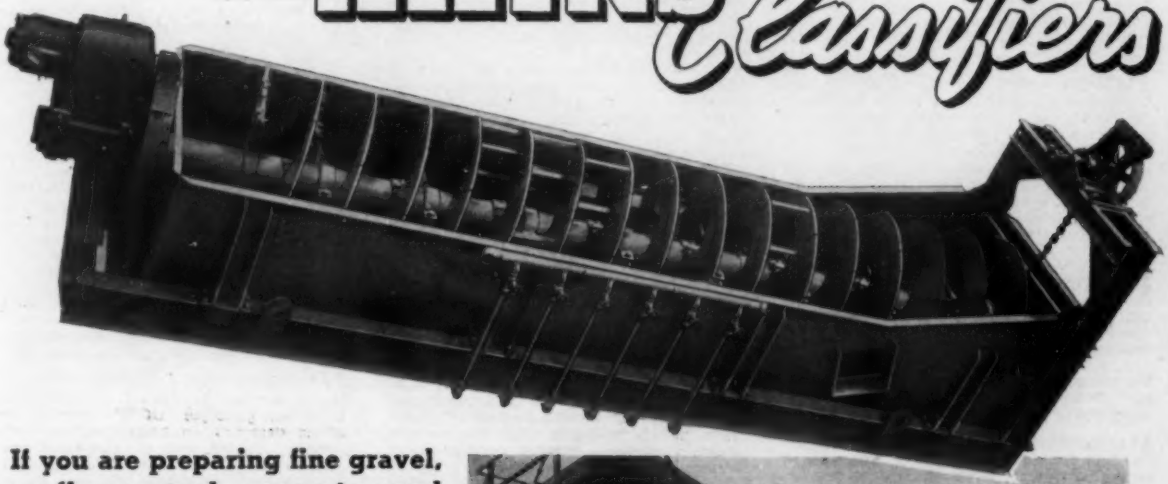
The use of lime is not only moving many other nutrients off the clay, but it helps the plant to get more of almost all of them seemingly by affecting the plant's conditions favoring. the movement of other things into the root. Plants grown in a limed soil and transplanted to another soil took up more nitrogen in their new location than if not originally given access to calcium. Lime has helped the plants move more magnesium into themselves. As a consequence, attention must go to other fertility elements as well when the foremost shortage in calcium is remedied and crop yields go up to bring into prominence a shortage in some other item. It was the ancient art of liming in vogue ahead of fertilizers that said "Lime and lime without manure, makes father rich but son poor."

Doubtless we shall use limestone heavily while mechanical means now

(Continued on page 131)

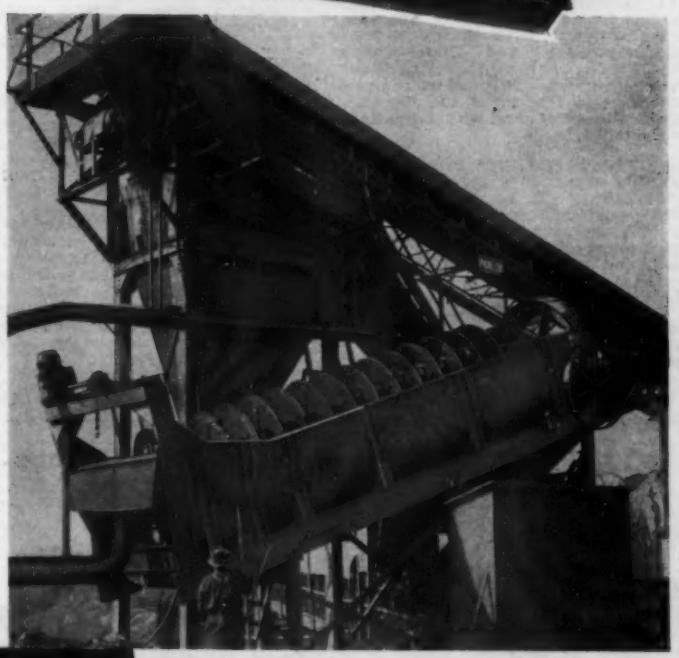
EXAMINE THIS *Better* WAY FOR WASHING GENERAL PURPOSE SANDS

with AKINS *Classifiers*



If you are preparing fine gravel, roofing gravel, concrete sand and "high-specification" sands, it will pay you to investigate the AKINS CLASSIFIER. Power costs are low . . . . maintenance negligible. Unloading is unnecessary to start after shutdown.

No elaborate arrangements essential for flexible operation. Let one of our engineers present the facts in detail.



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SMELTING EQUIPMENT

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INFORMATION

TO HELP YOU MEET TODAY'S PROBLEMS AND TO MAKE PLANS FOR TOMORROW

You can obtain catalogs listed on these pages by merely checking and mailing the coupon below.

1 BULLDOZERS—The Baker Mfg. Co. new Catalog 849 describes and illustrates cable controlled bulldozers and grade-builders. Complete details and specifications are given.

2 CLAMPS—The B. F. Goodrich Co. has published a 6-page folder, Form 108-Elec., describing and illustrating the Punch-Lok method of banding and splicing electrical applications. The folder describes the tools used, lists sizes of preformed and open end clamps, and tells in detail how to apply the bands on many electrical jobs such as connecting, splicing, reinforcing, tieing and repairing lines.

3 COATINGS—Preferred Utilities Mfg. Co. has issued Bulletin No. 925 describing and illustrating the White Hot and the Pyro-Chrome paint coatings for protection of refractories, metals, ceramics, etc., such as kilns, ovens, vaporizing oil-burner combustion chambers, economizers, air heaters, high-temperature insulating-materials, etc.

4 COMPRESSORS—The Jaeger Machine Co. has issued Catalog JC-5, describing and illustrating 2-wheel and 4-wheel, gasoline-powered and Diesel-powered "Air Plus" compressors. "Travel-Air" tractor mounted and powered compressors are also illustrated and described. Specifications, dimensions and weights are included.

5 CONTROLLERS—The Bristol Co. has published a new 16-page bulletin, describing the new Microact and other electric-type Pyromaster controllers. Several different types are illustrated, contact and load circuit wiring diagrams are given, and typical applications are indicated.

6 CONVEYORS—Chain Belt Co. has released a new bulletin No. 462 describing and illustrating Rex apron and pan feeders and conveyors for handling coal, coke, ore, cemnt, rock, etc. The bulletin contains design details, cross sections, capacity tables and specifications tabulated for quick comparison.

7 COUPLINGS—Link-Belt Co. new 8-page book No. 2045 describes and illustrates a complete line of shaft couplings. Sizes, dimensions and list prices are given for couplings of flexible, rigid flanged face and compression types, also detailed information on protective castings for the RC coupling.

8 DIFFERENTIAL — Thornton Tandem Co. has published a new brochure entitled "The Sensational War Tested Differential for Trucks—Stop Wheel Spin" describing and illustrating automatic-locking differentials. It also shows the application and explains the benefits derived from the installation of such a differential.

9 DRILLS—The Cleveland Rock Drill Co. has released Catalog 42R describing and illustrating various models of sinker drills, paving breakers, clay diggers and tampers, drifters, stopers, wagon drills, riveters, air drills, sand rammers, rotary grinders, and accessories. Specifications and prices are also given.

10 DRIVES—Mulitple V-belt Drive Association has released a booklet entitled "10 Reasons Why It Is the Dominant Drive of Industry" describing and illustrating the efficiency, ruggedness, smoothness, adaptability, etc., of multiple V-belt drives.

11 DUST COLLECTION—Aerotec Co. new bulletin No. 101 deals with the problem of efficient fine dust collection, particularly in the range 325-mesh screen or finer. Included in the bulletin are precipitating tests on various dusts in the industrial field. Also shown are sizes available in Aerotec units from single tubes to 100,000 c.f.m.

12 FILTERS—First Machinery Corp. has released Catalog 45 describing and illustrating filters, classifiers, rod mills, kilns, various types of crushers, screens, mixers, cranes and shovels, various types of dryers and coolers, autoclave and pressure vessels. Weights and specific gravities, metric equivalents, engineering constants and other useful information are also included.

13 GENERATORS—General Electric Co. has released a new 12-page booklet, GEA-4324, describing and illustrating electric tachometers, generators and instruments used to measure rotational speeds from 1 to 60,000 r.p.m., and linear speeds which can be measured in terms of r.p.m. Descriptions, speed ranges, and specifications are also included.

14 HARD-FACING—Mir-O-Col Alloy Co. has issued a new edition of Welders Guide to Successful Hard-Facing, containing many hints and helps on the uses of hard-facing metals which can be hard-faced, description, reasons and applications of acetylene and electric processes of hard-facing, etc.

15 HEATERS—Allis-Chalmers Mfg. Co. new 4-page bulletin, B6372, describes and illustrates electronic heaters for induction heating of metals and dielectric heating of non-metallic materials. Illustrations of typical production set-ups of the standard 20 kw. heater are included.

16 LIFTING MAGNETS — Stearns Magnetic Mfg. Co. has issued a new bulletin 35-A describing and illustrating lifting magnets. The bulletin contains interesting material on applications, specifications, and other informative material.

17 LUBRICATORS — Oil-Rite Corp. has issued Section 61, Page 1, describing and illustrating Style DOSF gravity feed oilers designed to keep dirt and other foreign matter out of machines, with glass reservoirs and sights available for temperatures exceeding 150 deg. F., also Section 21, Page 1, describing and illustrating Style J constant level lubricators. Specifications for Types J, B, LP and SPO lubricators are given on another sheet, Eng. 5.

18 SEPARATORS—Stearns Magnetic Mfg. Co. has released a new Bulletin 701-A illustrating and describing Type K series of magnetic separators of the gravity and deflector design.

19 SHEAVES—Vulcan Iron Works new bulletin No. A-396 describes and illustrates "Allcasteel" sheaves. The bulletin contains complete information regarding this sheave and useful engineering data.

20 SPRAY GUNS—The B. F. Goodrich Co. has issued a 22-page booklet, Catalog No. 15, describing and illustrating Lonn blow and spray guns and water savers which have only three working parts and give fingertip control of air or water under pressure without the use of levers, springs, push buttons, packings or screws. Each gun is pictured, its applications outlined, and other pertinent details given. Attachments are also described.

21 STEEL—American Manganese Steel Div. of American Brake Shoe Co. has released a 32-page illustrated bulletin, 1144-NM, on non-magnetic uses of manganese steel. Presented in this bulletin are studies with illustrations of typical applications including lifting-magnet cover plates, collector shoes, fingers for stator cores, magnetic separator drums and rollers, aircraft instrument testing devices, etc.

22 STRAINERS—J. A. Zurn Mfg. Co. has published a fluid handling equipment catalog No. 45 which describes and illustrates a complete line of suction and pressure line fittings such as various types of pipe line strainers, discharge check valves, safety vents, foot and back-water sewer valves, interceptors, and floor and area drains.

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ROCK PRODUCTS, 309 W. Jackson Blvd., Chicago, Ill.

I would like to have the items circled. 10-45

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Having trouble finding space for DUST RECOVERY EQUIPMENT?

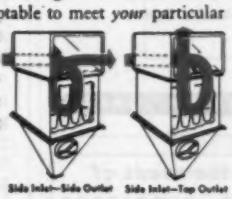
THESE 4 MULTICLONE SPACE-SAVING ADVANTAGES MAY BE THE ANSWER!

MULTICLONE Collectors offer unusual advantages in compactness and adaptability to the space limitations of all types of industrial plants. MULTICLONES can frequently be installed in even waste spaces—out-of-the-way areas too small for other types of recovery equipment. And in any installation—new plant or old—MULTICLONE'S unusual compactness permits important savings in both installation and operation . . .

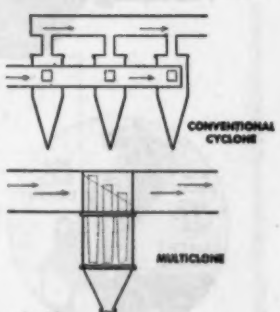
GREATER COMPACTNESS: To begin with, as shown in this chart, the MULTICLONE unit itself requires less space than other equipment of comparable performance . . .

Make	Relative Space Requirements In Sq. Ft.	In Cu. Ft.
Multiclone	1.0	1.0
Collector A	2.1	1.8
Collector B	3.9	3.2
Collector C	6.8	3.9

MAXIMUM FLEXIBILITY: Another advantage—MULTICLONE inlet and outlet hook-ups are readily adaptable to meet *your* particular requirements. Side-inlet side-outlet or side-inlet top-outlet arrangements are easily made, giving wide flexibility to fit cramped spaces. And where necessary, even top-inlet side-outlet construction is available.

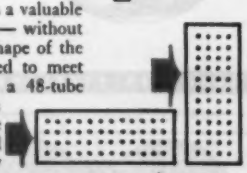


Side Inlet—Side Outlet Side Inlet—Top Outlet



SIMPLE DUCT REQUIREMENTS: In contrast to conventional cyclones which require complicated space-wasting inlet and outlet arrangements, the MULTICLONE requires only simple inlet and outlet ducts that save headroom and permit a far more compact installation.

FITS CRAMPED SPACES: And here's a valuable MULTICLONE space-saving feature — without affecting capacity or efficiency the shape of the MULTICLONE can generally be varied to meet specific space needs. For example, a 48-tube unit can be supplied either 12 tubes wide and 4 tubes deep to fit a wide shallow space...or 4 tubes wide and 12 tubes deep to fit a long narrow space...or still other tube patterns to meet space requirements.



—the compactness and space-adaptability of the MULTICLONE is only ONE of its many advantages. Its small tube design with patented vane for guiding and distributing the gases means high recovery efficiency of both large and small particles • Its flat sides and simple ducts reduce both installation and insulation costs • It has no high speed moving parts to maintain • These and still other MULTICLONE advantages are outlined in this booklet. Send for a copy today!

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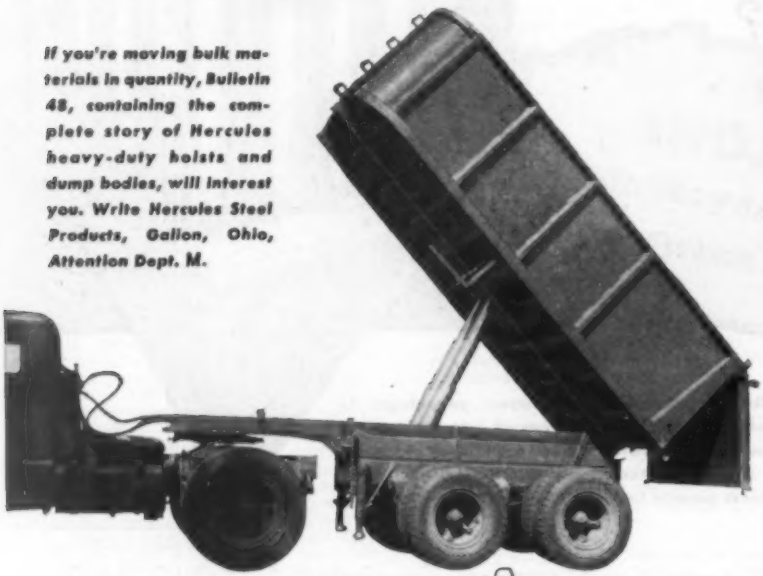
RAILROAD WITHOUT RAILS!

Just two trips with one of these 22-ton Hercules trailer dump bodies and you've moved a full railroad carload of limestone, gravel, coal, crushed stone or any other bulk material. These designed-for-duty, built-for-business dump bodies carry 17 yards in every load—that's moving material the BIG way!

And it's the economical way, too, for one 22-ton load, moved quickly and easily in a Hercules trailer unit, eliminates numerous trips with dump trucks of lesser capacity, cuts time, labor and operating costs to the minimum. This extra capacity also makes it practical to move materials longer distances by truck, avoiding additional handlings required with combined truck-rail hauling.

If you're moving bulk materials in quantity, Bulletin 48, containing the complete story of Hercules heavy-duty hoists and dump bodies, will interest you. Write Hercules Steel Products, Galion, Ohio, Attention Dept. M.



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Sand Separation

(Continued from page 116)

with square mesh cloth, and on the lower half of the same deck with a perforated plate, with vanes or baffles inclined or lifted slightly in a direction contrary to the flow of material, have been used successfully to remove flat pieces of slate, stone or gravel. The round or cubical particles pass over, but the slabby pieces are caught and drop through the slots.

Nearly all screen and screen-cloth manufacturers have acquired a lot of experience in solving such special problems, and operators are invited to consult them. As one manufacturer of screen cloth frankly says, it is not advisable to order any cloth in quantity until experiment or experience has proved it is the right one for making the product desired, or for best functioning in a particular operation. Similarly, it is wiser to start out with the cheaper steel wire screens, before adopting the more expensive high carbon- or alloy-wire screens. As we have emphasized several times, what is needed most is to make available complete operating data on vibrating screen installations. The three national associations in the mineral aggregate industries would be the logical repositories for such data, and we urge again that members of these associations seriously consider starting the collection of the data now.

Determining Magnesium and Calcium

A NUMBER of time and money saving methods for analysis of limestone and lime have been described in ROCK PRODUCTS and other publications during recent years. Most of these are potentiometric or spectrophotographic metods. The National Lime Association points out that "it is now possible to make a complete analysis of a lime in less than an hour with an accuracy even better than is usual by the old-fashioned gravimetric or volumetric methods, a development made possible by the improvements in glass electrode and spectrophotometric equipment. A recent publication describes a potentiometric method for Mg in dolomite and magnesite used by the Basic Magnesium Company. It would appear that Subcommittees V or VI of C-7 (A.S.T.M.) might consider the matter of new rapid methods for analysis of limestone and lime to replace the outmoded present standard methods, if this is within their province."

Cement Research in Sweden

CEMENT AND CONCRETE INSTITUTE, recently financed by Skanska Cement A/B, is equipped with an up-to-date laboratory and facilities for making outdoor and indoor tests.

Agstone

(Continued from page 126)

favor that operation from quarry to field and until fuller understanding of the services and values of calcium have become more common knowledge. But soon we shall doubtless put lime on the soil according to the clay content of it, the nature of that clay, and the extent to which it is already delivering calcium. We shall very probably gear the use of lime into agriculture as fertilizers are being geared; namely, with the soil and plant in mind. If so, we shall be making smaller lime applications, but probably oftener. These will be according to the soil needs and the natural losses of lime. The practice will doubtless progress just as fast as the sciences, particularly those of agriculture, guide it wisely.

Agricultural Limestone Business Grows Up

As the stronger light of science is being turned on the practice of liming the soil, limestone is becoming an important factor in food and feed production. This soil treatment provides calcium, correcting the foremost deficiency among the mineral elements coming from soils in which gross shortages are made evident by animal troubles and human health irregularities. The sure effects of this correction are shown by animal choices of herbage on limed soil in preference to that on soil not limed. The same is shown in the better gains made by animals receiving feed produced on limed land. And so the evidence piles up to prove the soil's need for calcium and the value of limestone as timely prescription for soils made sick and unproductive by calcium deficiency. Limestones are the calcium once moved from the land and given up by the many life forms to be deposited in the seas of eons ago. Grinding them for agricultural use is, then, the return of this nutrient to the lands and to life again for another cycle of service by this life-giving grist.

Sell Monon Stone

(Continued from page 101)

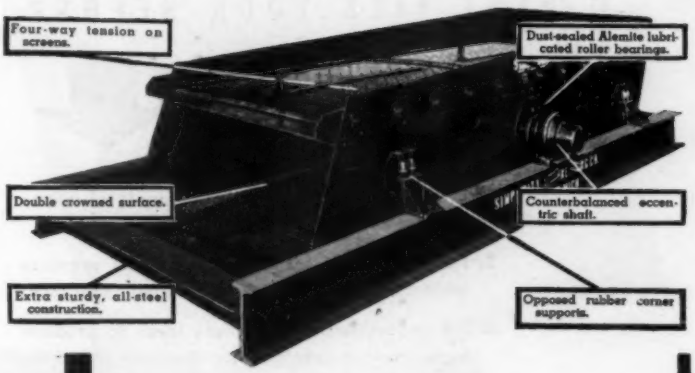
Stripping is accomplished by a Marion No. 36 steam shovel, full revolving on crawler treads. Drilling is accomplished by 6-in. well drills; two Sanderson-Cyclone electrics on traction treads, two Loomis Clipper gasoline-driven drills and a Bucyrus-Erie blast hole drill installed in recent years. It is of interest that the same drilling practices are employed today as 17 years ago when an article was written describing the entire operation. Holes are sunk several feet below the quarry floor, with a 12-ft. burden on 12-ft. centers, double staggered. Anywhere from 10 to 135 holes are shot simultaneously. Blockholing is done with Ingersoll-Rand jackhammers, Gardner-Denver and

Talk About Concentrated Screening Force!

Simplicity

GYRATING SCREENS

Grade larger tonnages in more accurate sizes



ON Simplicity Gyrating Screens all force is concentrated directly across the screen surfaces. The counterbalance is machined directly on the shaft, and it exactly balances the weight of the entire vibrating screen deck assembly. In this way it "builds up" positive action across the screen surfaces with perfect smoothness. This is one of the many Simplicity reasons for improved screening.

CONSIDER your separation in terms of screen capacity, screen life, and the grade of material separated and you will always find Simplicity Gyrating Screens on top in the long run. Your own screening problem may fit into one of the hundreds solved with complete satisfaction by the army of Simplicity users. And if it is something of an extra special nature, the broad experience of Simplicity Engineers can be relied upon to produce an answer that will give you both quality and economy in operation.

Simplicity

ENGINEERING COMPANY · DURAND MICH.

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Wilfley Tables

BEST FITS YOUR NEEDS?

1. Before or after flotation for recovery of coarse mineral not readily susceptible to flotation.
2. For separations (or grading up) from previous table concentration or from original table feed.
3. For concentrating low grade feeds to produce high grade concentrate for chemical treatment and tailings.
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Send for BULLETIN 64-B

Other Mine and Smelter Products:
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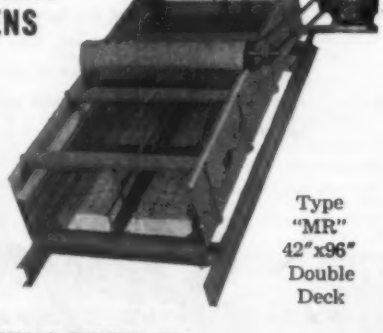
Guaranteed to give you best results on your most difficult separations. UNIVERSALS are of rugged yet simple construction, lowest in first cost and in maintenance. UNIVERSALS have been tried and proved in 25 years of dependable service.

Write for 32-page catalog on screens and screening.



Type "MR" 42"x96" Double Deck

★ ★ ★ UNIVERSAL VIBRATING SCREEN CO. ★ ★ ★
RACINE - - WISCONSIN

Hardsocg drills. Rock is excavated by a No. 50 Marion steam shovel on crawlers and a No. 37 Marion electric with Ward-Leonard control.

The plant itself has undergone certain changes over the years to improve efficiency. In the early days, there were three gyratory crushers and, in 1922, two additional were added. Further changes came later and the plant now has six crushers; a No. 18 Allis-Chalmers gyratory, a No. 8 Austin gyratory, two Symons cone crushers (a 3-ft. and a 2-ft. short-head), a 2-ft. Kennedy gyratory crusher and a set of 42-in. Allis-Chalmers rolls. Agricultural limestone is a valuable by-product, produced through this combination of crushers. The No. 18 primary rests between two inclines, the arrangement having been designed for two-way dumping of cars, each incline being served by an Allis-Chalmers single-drum hoist. This phase of the operation likely will be changed in connection with quarry truck haulage and other anticipated changes in the quarry.

Changes in the screening plant, made within recent years, involved the substitution of vibrating screens for revolving screens, including an Allis-Chalmers 3-deck and a 16-ft. Symons horizontal screen. Intra-plant handling is by bucket elevators. Nine loading bins directly beneath the screening plant provide for either carloading or truckloading, and stock-piled stone is stocked and reclaimed by a 20-ton Browning crane, steam-driven, with a 1¼-cu. yd. Kiesler bucket.

The plant has been undergoing a gradual conversion from steam power to electrification over the years. Repair shops on the premises are exceptionally well-equipped, including machine shop and welding equipment to make repairs and for drill sharpening, etc.

The plant serves a radial territory of about 75 miles. It is on the main line of the Monon route, Monon being on the junction point so that the company is enabled to ship north as far as Chicago and south as far as Louisville, as well as into the Indianapolis territory over a branch line.

W. B. NEUMAN, who has been with the company since the beginning, and as sales manager for 26 years, continues in that capacity. WILLIAM COOLEY is secretary and J. J. McCORMICK is auditor.

Lime Soundness Test

NATIONAL BUREAU OF STANDARDS has devised an accelerated autoclave test for determining expansion of different types of hydrated lime used in plaster. Of 57 different samples tested there were only a few limes which, when mixed with different portland cements, gave expansions higher than desired. It is believed that incomplete hydration of magnesia in the manufacturing stage is a principal cause.

Safe Quarry Practices

(Continued from page 99)

Trailing cables to the shovels and drills are maintained in good repair, only vulcanized splices being used. Wooden tripods are used throughout the quarry wherever possible, to keep the cables from contacting the ground. Wooden frames also are provided for temporarily passing cables over tracks and roadways. The frames are two A-shaped wooden members hinged at the top so that they can be folded when they are moved to new locations. They are equipped with a block and tackle for hoisting the cable and lowering it into a saddle provided on top of the frame. The frames of the shovels and drills are grounded to the ground wires in the trailing cables, which are connected to a permanent ground wire for all circuits in the quarry. In addition, an automatic ground-preventive system has been installed, whereby the circuit breakers on the feeder lines are opened automatically whenever grounding occurs. From tests made on the protective system, it is claimed by the Portland Cement Association that operations of drills and shovels provided with such equipment should be 99.9 percent safe in respect to electrical-shock hazards.†

This plant and quarry have an enviable safety record; there were no lost-time accidents in 1944 and only seven minor accidents requiring first-aid treatment during the same period. All quarry employes have been trained in first aid by Bureau of Mines instructors, but refresher courses have not been given for about three years.

Safety meetings for supervisors are held at weekly intervals, and safety meetings for all employes are held each month.

Special Safety Features in the Quarry

1. Tripods for elevating trailing cables above the ground.

2. Four-legged, hinged, wooden towers equipped with saddles and block and tackle for elevating trailing cables, which provide overpasses at rail and road crossings.

3. An efficient ground-preventive system.

4. The containers on the back of shovels for coiling trailing cable, which allow leeway in moving shovels backwards without shovel treads contacting the cable.

5. Push buttons on each rear corner of shovel cab to warn operator in an emergency.

The writer is indebted to Scott Wilson, plant manager, and Robert L. Storms, quarry superintendent, for their cooperation in obtaining the above information.

†Taken from Portland Cement Association Accident Prevention Bulletin 1. "Protective Measures and Devices for Electrically Operated Quarry Equipment."

POST-WAR GUIDE FOR PIPE USERS

On what applications can light-weight pipe do a better job for you? Why does Naylor Pipe provide advantages found in no other light-weight pipe? What new Naylor development has revolutionized pipe coupling? The answers to these and many other questions of importance to you are presented in the new Naylor Catalog just off the press. Here is a practical guide that provides a working tool for everyone planning post-war piping.

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SPIRALWELD PIPE

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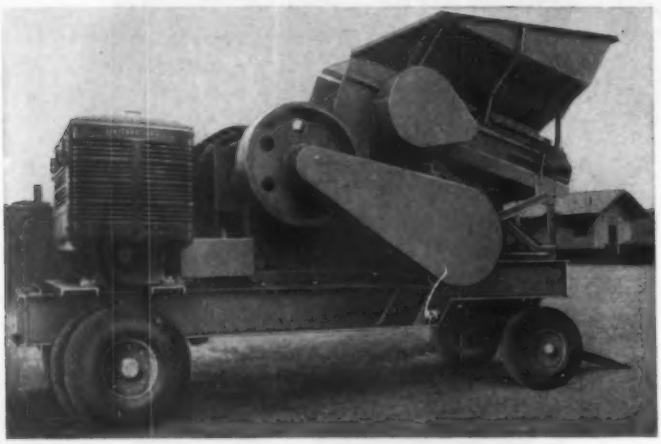
GRUENDLER...BUILDERS OF CRUSHERS WITH A REMARKABLE RECORD OF ACCOMPLISHMENTS

A Primary Crushing Unit developed to meet the increasing demand for every new plant and to step up production in your present plants



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This big capacity Portable Rock Crushing Plant is fast becoming the choice of operators who demand more tons per hour output of uniformly crushed aggregate.

Manufacturers of

PRIMARY and SECONDARY HAMMERMILLS — Complete ROCK and GRAVEL CRUSHING SCREENING and CONVEYING EQUIPMENT

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MANGANESE STEEL CASTINGS

for PULVERIZERS CRUSHERS ROLLS SCREENS

for SHOVELS DREDGES CRANES CONVEYORS

The Frog, Switch & Mfg. Co.

Established 1881 CARLISLE, PA.

Pennsylvania Meeting

(Continued from page 110)

E. A. Weymouth, Pittsburgh Limestone Corp., Pittsburgh.
John Curtin, Sr., Warner Company, Bellefonte.
Paul Hartsock, Warner Company, Bellefonte.
F. W. Schmidt, North Jersey Quarry, Morristown, N. J.
Harvey Clark, Dolomite Products Co., Rochester, N. Y.
Harry R. Hayes, N. Y. State Crushed Stone Ass'n., Albany, N. Y.
William M. Avery, Pit & Quarry Pub., Chicago, Ill.
Chas. M. Fink, H. E. Millard Co., Lebanon.
J. R. Chamberlin, Norristown.
J. Walter Harward, The General Crushed Stone Co., Philadelphia.
H. B. Allen, The General Crushed Stone Co., Philadelphia.
Milo A. Nice, Hercules Powder Co., Wilmington, Del.
Larry Seaman, L. B. Smith, Inc., Camp Hill.
J. Albert Savage, Mausdale Quarry Co., Danville.
J. C. Blackburn, Mausdale Quarry Co., Danville.
Ed. Edmondson, Mausdale Quarry Co., Danville.
Chet Cooke, Mausdale Quarry Co., Danville.
J. Ben Millard, H. E. Millard, Annville.
W. L. Shield, American Cyanamid & Chem. Corp., Pittsburgh.
C. T. Burton, American Cyanamid & Chem. Corp., Cumberland, Md.
J. Joe Kobella, Jr., American Cyanamid & Chem. Corp., Hollidaysburg.
T. C. McPoyle, John T. Dyer Quarry Co., Birdsboro.
N. Cascetti, Stowe Trap Rock Co., Philadelphia.
W. V. Pietsch, Bacon-Pietsch, New York.
Harry K. Burchfield, American Bitumuls Co., Harrisburg.
H. R. Brunner, John T. Dyer Quarry Co., Birdsboro.
Carl Beckler, Bethlehem Steel Co., Bethlehem.
H. W. Lynn, Bethlehem Steel Co., Steelton.
V. N. Seals, Frog, Switch & Mfg. Co., Carlisle.
H. W. Welch, Frog, Switch & Mfg. Co., Carlisle.
H. W. Craig, The John T. Dyer Quarry Co., Birdsboro.
F. M. Evans, The John T. Dyer Quarry Co., Birdsboro.
Frank Good, The John T. Dyer Quarry Co., Birdsboro.
S. Weiler, The John T. Dyer Quarry Co., Birdsboro.
F. B. Kohr, H. E. Millard, Annville.
H. E. Eyster, The J. E. Baker Co., York.
J. R. Thomas, The J. E. Baker Co., York.
George P. Greene, Conyngham.
Lester A. Sheaffer, Steelton.
R. D. Burns, The John T. Dyer Quarry Co., Berwyn.
H. E. Kleintop, Korb-Pettit, Philadelphia.
Jos. J. Atkinson, Korb-Pettit, Philadelphia.
R. L. Carr, Korb-Pettit, Philadelphia.
Frank Pulford, Marion Steam Shovel, Philadelphia.
John Love, Whiterock Quarries, Bellefonte.
H. D. Lutzill, Whiterock Quarries, Bellefonte.
G. Hunter Knissley, Whiterock Quarries, Bellefonte.
H. O. Hunt, Timken Roller Bearing Co., Philadelphia.
Ray C. Noll, Whiterock Quarries, Bellefonte.
Baxter Reynolds, L. B. Smith, Inc., Harrisburg.

R. A. Zimmerman, Calcite Quarry Corp., Lebanon.
A. R. Amos, Jr., Smith Engineering Works, Philadelphia.
G. E. Patten, Calcite Quarry Corp., Lebanon.
Jonas Dunmoyer, Calcite Quarry Corp., Lebanon.
T. L. Murphy, Chicago Pneumatic, Philadelphia.
Miles A. Zeller, Amer. Manganese Steel, Pittsburgh.
C. H. Roberts, Traylor Eng. & Mfg. Co., Allentown.
E. H. Beyhl, Traylor Eng. & Mfg. Co., Allentown.
M. A. Pugh, J. C. Showalter, Manheim.
H. L. Lyman, Williamsport.
John Robertson, Williamsport.
F. DeCario, Williamsport.
A. Wittmer, Williamsport.
Geo. Machamer, Williamsport.
Otto Wagner, Williamsport.
John A. Hare, Bethlehem Steel Co., Bethlehem.
C. G. Bicking, Bethlehem Steel Co., Bethlehem.
N. A. Coulter, N. A. Coulter Co., Harrisburg.
T. J. Bachhuber, Koehring Co., Milwaukee, Wis.
E. S. Wood, Hercules Cement Corp., Harrisburg.
Earl E. Ebersole, Geo. E. Ebersole & Sons, Highspire.
F. E. Sorensen, Atlas Powder Co., Philadelphia.
H. W. Brown, N. A. Coulter Co., Harrisburg.
Paul Rexroth, Harrisburg.
H. W. Riebe, Charles Riebe, Palmerton.
Marshall Keener, J. C. Showalter, Cornwall.
B. Hartman, H. E. Millard, Lebanon.
J. Bernhardt, H. E. Millard, Lebanon.
E. Edkin, H. E. Millard, Lebanon.
J. Duffin, Lebanon.
John Aregood, Hercules Cement Corp., Orwigsburg.
H. M. Binkley, Binkley Bros. & Ober, East Petersburg.
C. Ralph Binkley, Binkley Bros. & Ober, East Petersburg.
Leonard Fry, Fry Coal & Stone Co., Mercersburg.
P. B. Reinhold, Atlas Equipment Corp., Pittsburgh.
W. N. Quigley, W. N. Quigley Quarries, Mifflin.
George L. Meitz, Lone Star Cement Co., Harrisburg.
John L. Stevenson, Smith Engineering Co., Philadelphia.
Edward Daylor, Philadelphia.
James J. Skelly, American Road Builders, Media.
A. E. O'Brien, Asso. Penn. Constructors, Harrisburg.
W. W. Crumling, Harold R. Kline, York.
W. E. Harman, Harold R. Kline, York.
John Bixler, Assoc. Penn. Constructors, Harrisburg.
H. D. Maxwell, Jr., Collins & Maxwell, Inc., Easton.
J. B. Terbell, American Manganese Steel, New York City.
R. W. Fish, Mack Truck Corp., Harrisburg.
Frank Vanatta, Bethlehem Steel Co., Steelton.
W. E. Bondman, Bethlehem Steel Co., Steelton.
Franklin Rodney, Bethlehem Steel Co., Steelton.
H. C. Knight, L. B. Smith, Inc., Philadelphia.
Harry Kohler, L. B. Smith, Inc., York.
Harold Poorman, L. B. Smith, Inc., Hershey.
Geo. Stauffer, Penn-Harris, Harrisburg.
F. T. Fulghum, Hercules Powder Co., New York City.
G. E. Peterson, Bucyrus-Erie Co., Washington, D. C.
Reeves Hill, DuPont Co., Hagerstown, Md.

It Doesn't Take Long to Change Tips on These Pulverizer Hammers . . .

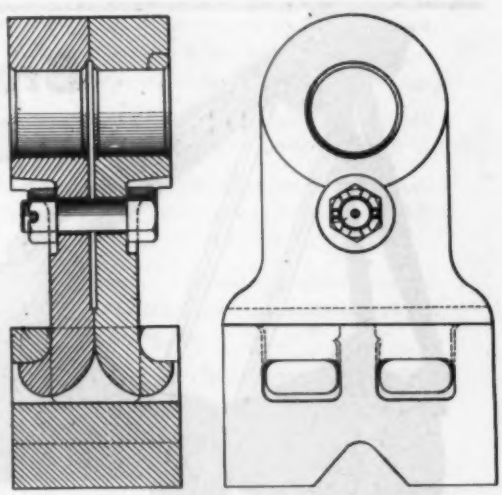
In the Amsco-Clark renewable-reversible tip pulverizer hammer, the time consumed in reversing tips or removing old and applying new tips is negligible. After removing the worn hammers from the rotor arbor, all that need be done is to remove the bolt that holds the two-piece shank together, spread the shank apart and the renewable tip comes off. A new tip is easily installed by reversing this procedure.

Reversing a tip end for end can be accomplished with equal ease. The reversible tip feature of Amsco-Clark pulverizer hammers affords double wear life. About 75% of the tip metal can be used before replacement is necessary, while the duplex shank will outlast many tips. Apertures in the sides of the tips reveal how much wear has taken place so that tips can be reversed or replaced before the shank is exposed to wear.

The tips and shanks are made of austenitic manganese steel, which work-hardens under repeated impact, developing a wear resistance which no other metal can equal in severe service, while at the same time retaining its body toughness to withstand shocks and stresses.

The advanced design of Amsco-Clark hammers also includes an assembly in which the tip cannot work or wear loose from the shank as long as the latter is on the supporting rod. There is no operating strain on the bolt which holds the two part shank together; and the same size tip can be used on longer or shorter shanks.

Please give us the pulverizer make and pattern number on your present hammers when inquiring for prices.



These drawings reproduced from patent application show how easily the Amsco-Clark hammer is assembled and taken apart.

How Renewable Lip on Amsco Dippers Saves Time Is Told in Bulletin 641-D

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
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AMERICAN Brake Shoe COMPANY

UP GOES YOUR YARDAGE

DOWN GO YOUR SHOVEL REPLACEMENT COSTS

Wherever there's hand shoveling, here's the way to start cutting costs. Equip your men with RAZOR-BACK, the only fully modern shovel with tapered blade thickness and tubular shank — giving you full 13 gauge thickness and strength up the middle, to take the cutting wear and stand the strain, but only 15 gauge over-all weight and better balance to speed the moving of material.

Guarantees you the most shovel service per dollar today, when dollars must be saved for profits.

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SURFACE PEENED

"SURFACE PEENED"— Every shovel "cold-worked" following heat treatment,—tests 2½ to 5 times tougher than fine shovels merely heat treated.

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THE ONLY SHOVEL WITH A BACKBONE

ALSO STONE, BALLAST, INDUSTRIAL FORKS — ASPHALT AND ROAD RAKES

Brownhoist Buckets

ROPE REEVE •

POWER WHEEL • LINK TYPE

Handling ore, gravel, coal or dirt Brownhoist Buckets do a better job because: 1) Larger sheaves reduce rope wear, 2) Heavy carbon-steel digging lips take deep clean bites, 3) Extra-sturdy construction insures long-life. Write to Industrial Brownhoist Corporation, Bay City, Michigan. Offices in New York, Philadelphia, Pittsburgh, Cleveland and Chicago.

Pennsylvania Meeting

(Continued from page 135)

John P. Bleeg, DuPont Co., Pittsburgh.
Franklin W. Figner, Jr., Rutherford Bros. Explosives, Paxtang.
E. S. Storey, North Amer. Cement Corp., Baltimore, Md.
Earl H. Miller, Annville Stone Co., Hershey.
John Hoaster, Annville Stone Co., Hershey.
Geo. B. Herman, L. B. Smith, Inc., Camp Hill.
W. E. Wilson, Hoffman Bros. & Wilson, Harrisburg.
Edw. M. Prettyman, Annville Stone Co., Hershey.
Earl Miller, Annville Stone Co., Hershey.
Dick Gable, Annville Stone Co., Hershey.
Paul I. Detwiler, New Enterprise Stone & Lime Co., New Enterprise.
C. Galen Detwiler, New Enterprise Stone & Lime Co., New Enterprise.
R. S. Over, New Enterprise Stone & Lime Co., New Enterprise.
Robert R. Lauer, Calcite Quarries, Inc., Lebanon.
Wm. H. Frantz, Frantz Equipment Co., Philadelphia.
Gene Barrett, Frantz Equipment Co., Philadlphia.
Jack Seltzer, Frantz Equipment Co., Philadelphia.
J. W. Heisey, Heisey Bros., Rheems.
Joseph S. Larkin, Buckeye Traction & Ditcher Co., Findlay, Ohio.
G. F. Chapel, Pittsburgh Limestone Corp., Pittsburgh.
C. S. Fry, L. B. Smith, Inc., Camp Hill.
W. Stewart Taylor, M. Harvey Taylor & Son, Harrisburg.
J. F. Hempt, Hempt Bros., Camp Hill.
O. H. Coon, A. P. Co., Kingston.
J. W. Cooper, International Harvester Co., Harrisburg.
B. H. Ellenger, Gulf Oil Co., White Hill.
C. R. Myers, American Bitumuls Co., Harrisburg.
E. A. Woolford, L. B. Smith, Inc., Camp Hill.
R. H. Stewart, Standard Equipment Co., Harrisburg.
John F. Miller, Standard Equipment Co., Harrisburg.
A. Reinfried, L. B. Smith, Inc., Camp Hill.
R. V. Daniels, L. B. Smith, Inc., Camp Hill.
R. H. Edgerton, Smith Engineering Co., Philadelphia.
H. M. Van Cleve, General Crushed Stone Co., Wilkes-Barre.
R. D. Buckwalter, New Holland Machine Co., New Holland.
W. E. Figner, New Holland Machine Co., New Holland.
Geo. E. Frey, Dept. of Highways, Harrisburg.
A. B. Morgan, New Holland Machine Co., New Holland.
I. A. Daffin, New Holland Machine Co., New Holland.

Lithium

ACCORDING to the Bureau of Mines the quantity of lithium ares comprising chiefly spodumene and dilithium sodium phosphate, produced in the United States in 1944 set a new record. That year saw a production of 13,319 short tons compared to 8155 short tons for 1943. The Solvay Process Co. plant at Kings Mountain, N. C., was the major producer followed by the Black Hills Tin Co., at Tinton, S. Dak. Increased output in dilithium sodium phosphate is attributed to the installation of a flotation mill at Searles Lake, Calif., by the American Potash & Chemical Corp. A new lepidolite producer is Rayden Mining Co.

OBITUARIES

FRANCIS O. WYSE, a member of the board of directors of the Manufacturers' Division of the National Crushed Stone Association, died September 15, following a long illness. He was 48 years of age. Mr. Wyse was publicity manager of Bucyrus-Erie Co., South Milwaukee, Wis. He joined the company in 1924 and two years later took over the management of the publicity department. He served as secretary-treasurer and vice-president of the National Industrial Advertisers Association before being elected president in 1937. He also served as president of the Milwaukee Association of Industrial Advertisers in 1932-33.

Mr. Wyse's publicity activities identified him with the National Crushed Stone Association and he became a member of the board of directors of the Manufacturers' Division in 1934, serving in this capacity until the time of his death. He was elected chairman of the directors for 1934 and was one of three representatives of the Manufacturers' Division on the board of directors of the National Association. In 1938-39 he was chairman of the publicity committee of the American Road Builders Association.

•

LOUIS H. GARTMAN, president of the Van Der Vaart Brick and Building Supply Co., Sheboygan, Wis., passed away September 2. He was 44 years of age. Mr. Gartman started with the brick company as a salesman and became vice-president and general manager upon the death of George Van Der Vaart in 1932. He continued in this capacity until 1936 when he became president of the company following the death of John Van Der Vaart. Under his leadership the company erected a ready-mix concrete plant in 1940 and purchased the Wiegand Concrete Products Co., Green Bay, Wis., in 1944. At the time of his death Mr. Gartman was serving as secretary-treasurer of the Wisconsin Concrete Pipe Association.

•

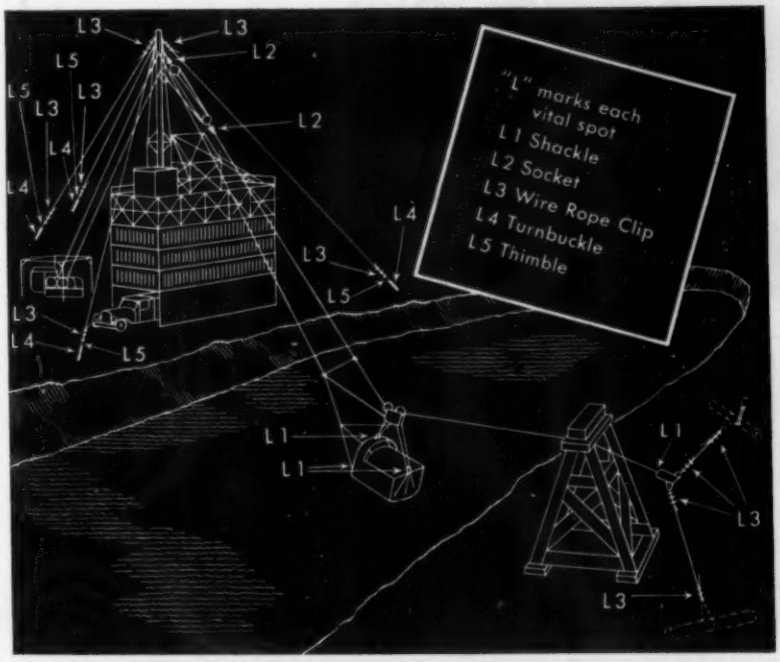
GUY O. GARDNER, production manager and director of research of the mid-west area of the Ash Grove Lime and Portland Cement Co., Kansas City, Mo., passed away recently in Chanute, Kansas. Mr. Gardner joined the company as a chemist in 1912 and was made assistant superintendent in 1917. Eight years later he was promoted to superintendent of the plant and in January, 1945, was appointed to the position he held at the time of his death.

•

MRS. MARY FOULDS HALL, president of the Piqua Stone Products Co., and the Ohio Marble Co., Piqua, Ohio, died recently at the age of 80. She had been president since the death of her husband A. Acton Hall, in 1923. Her father, Thomas Foulds, founded the Foulds Macaroni Co

HANG ON TO YOUR MONEY

WITH THESE DROP-FORGED FINGERS OF STEEL



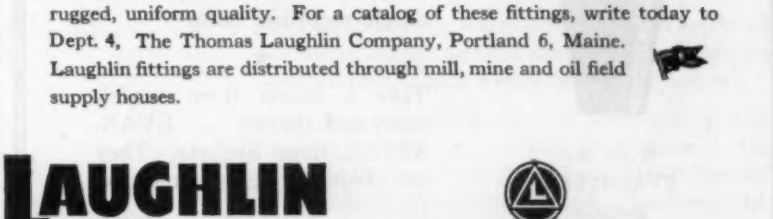
Wherever you use wire rope or chain — for hoisting and material handling in your plant, aboard ship, or on drag-lines for stripping and excavating — you can save money three ways by specifying Laughlin drop-forged fittings.

1. Save money on purchase price . . . because you can get *standard* fittings for almost any purpose from Laughlin's complete line.
2. Save money on materials . . . because drop-forged fittings — acknowledged superior for strength and long life — give your equipment full protection.
3. Save money by avoiding accidents . . . because Laughlin's fittings have more safety features than any other line . . . examples: unique "Fist-Grip" Safety Clip and Safety Hooks.

For over 78 years, Laughlin fittings have been highly regarded for their rugged, uniform quality. For a catalog of these fittings, write today to Dept. 4, The Thomas Laughlin Company, Portland 6, Maine. Laughlin fittings are distributed through mill, mine and oil field supply houses.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



Save Labor! Cut Costs!

with SAUERMAN CRESCENT SCRAPERS

Explanation of Picture—
Above is a Sauerman Crescent Scraper cutting deep into hill and hauling gravel to crusher. Bucket is pulled to rear of cut, gathers a heaping load, and carries load to hopper in a little over a minute; then dumps instantaneously into hopper. Simple and sure and cheap.
Write for Catalog

AT gravel and stone crushing plants, in strip mines and wherever there are problems of stockpiling or excavating, Sauerman Crescent scraper buckets daily demonstrate their ability to dig and deliver large tonnages of materials at costs of a few cents a ton.

The secret of "Crescent" efficiency is in the streamline design of this unique bottomless bucket. A Crescent scraper penetrates hard materials with the ease of a plowshare, and requires less line-pull than any other type of scraper to move a given load.

Ranging rapidly over a large area, loading and dumping automatically, a Crescent Scraper, operated by a Sauerman improved hoist, is the most productive one-man machine for digging and hauling.

SAUERMAN BROS., INC.

530 S. Clinton St. Chicago 7, Illinois

NOT *One* FAILURE *in a million!*

. . . that's a pretty good record but it is the one established by our chrome-nickel alloy ROPE SOCKETS

★

Yes, we have been making them for 36 years without a single recorded failure.

★

Take a lesson from experience, and specify . . . EVANSTEEL Rope Sockets. They are stronger, lighter, and cost less.

Write for EVANSTEEL Bulletin

CHICAGO STEEL FOUNDRY COMPANY

PYRASTEEL for high temperatures

KEDZIE AVE & 37TH ST.
CHICAGO 32, ILL.
Makers of Alloy Steel for 35 Years

EVANSTEEL for strength

FINANCIAL

RECENT DIVIDENDS

Consumers Co. pfd.	$1.50	Oct. 15
Coronet Phosphate Co.	1.00	Oct. 1
Dolese & Shepard Co.	1.00	Oct. 1
Ideal Cement Co.	.25	Sept. 29
Lehigh Portland Cement Co.	.25	Nov. 1
Pacific Coast Aggregates, Inc.	.05	Sept. 21
Pacific Portland Cement Co.	1.00	Oct. 29
Southern Phosphate Corp.	.10	Sept. 29

•

SUPERIOR PORTLAND CEMENT, INC., Seattle, Wash., announces that under the recapitalization plan recently declared effective, class A $3.30 no par convertible participating stock would be reclassified in class A $2.50, $50 par preferred. Holders of each share of class A preferred may exchange this security for $50 face value of debenture 5s, due 1969, plus ½ share of new no par common stock and accrued dividends until November 14.

•

THE WARNER CO., Philadelphia, Penn., has revealed the following earnings statement from S.E.C. reports:

	6 mos. to June 30,'45	Year to Dec. 31,'44
Net sales	$3,284,919	$6,674,203
Cost of sales	2,502,191	4,814,156
Depreciation & depletion	196,229	438,533
Selling, etc., expense	229,757	609,163
Operating profit	356,742	812,352
Other income	49,072	37,490
Rental inc., net	88,960	122,490
Total income	494,774	972,332
Bad debts res.	1,555	2,773
Discts. allowed	42,576	89,371
Interest	82,602	232,994
Bond disc. & exp.	1,530	7,789
Income tax	144,451	249,750
Net profit	222,059	389,656
Earn. surp., 1-1	2,511,552	2,061,896
Bad debts res.		cr 60,000
Earned surplus	2,733,611	2,511,552
①Times chg. earn.	5.36	3.65
Earn., 1st pfd. sh.	$9.68	$16.87
Earn., 2nd pfd. sh.	3.40	5.77
②Earn., com. sh.	0.76	1.21
No. 1st pfd. shs.	22,932	23,092
No. 2nd pfd. shs.	53,500	53,500
No. of com. shs.	177,192	177,192

①Before income taxes.
②Disregarding preferred arrears.

•

SCHUMACHER WALL BOARD CORPORATION, Los Angeles, Calif., had a net income of $32,620 for the three months ended July 31, 1945. This compares with a net income of $40,025 for a like period ended July 31, 1944.

•

BLUE DIAMOND CORPORATION, Los Angeles, Calif., presented the following statement of earnings for the six months ended June 30, 1945:

Net sales	$2,570,252
Costs and expenses	2,213,294
Selling and general expenses	203,065
Operating profit	153,893
Other income	4,716
Total income	158,609
Other deductions	4,347
Federal income tax	61,000
Net profit	93,262
Earned per share	$0.13
Number of shares	729,313

IDEAL CEMENT CO., Denver, Colo., reports that shipments of cement have been running ahead of last year, but the sudden end of the war and cutbacks in military construction make the immediate prospects uncertain. However, a large volume of peacetime government business is expected as the U. S. Reclamation Bureau will require a large quantity of cement to complete several big projects in Colorado. Net income for 1944, after an estimated tax credit for prior years of $640,000, was $1.11 a share compared with $1.48 a share in 1943, after a contingency reserve of $100,000. The company has paid dividends uninterruptedly for over 20 years.

•

NATIONAL GYPSUM CO., Buffalo, N. Y., has announced more details concerning its $8,500,000 postwar expansion program which is now under way. Construction has started on the new $2,000,000 gypsum board mill at Baltimore, Md., and work on a new $2,000,000 lime plant at Kerns, Va., will commence the later part of October. Other plants being expanded are the gypsum mill at Savannah, the fiber insulation board plant at Mobile, Ala., and the gypsum plant at Rotan, Texas. At Fort Dodge, Iowa, the company will spend about $500,000 for a new plaster mill and quarry operations. A $400,000 expansion at Clarence Center, N. Y., will increase production of plaster and gypsum wallboard by about 30 percent.

•

KENTUCKY STONE CO., INC., Louisville, Ky., has presented the following income account for the years ended April 30:

	1945	1944
Net sales	$1,245,649	$1,139,017
②Costs & expenses.	936,172	884,025
Depr. & depl., etc...	100,823	97,855
Operating profit ...	208,654	157,137
Inc. bond interest..	4,238	6,998
Income taxes	135,678	90,557
Net income	68,737	59,582
Dividends	11,625	11,625
Surplus for year...	57,112	47,957
Prev. earn. surp....	237,693	214,529
Debits, net	cr 41,623	24,793
Earn. surp., 4-30...	336,429	237,693
①Times chg. earn...	49.23	22.45
Earned per share...	$8.87	$7.69
No. of shares.....	7,750	7,750

①Before income taxes.
②After deducting other income.

•

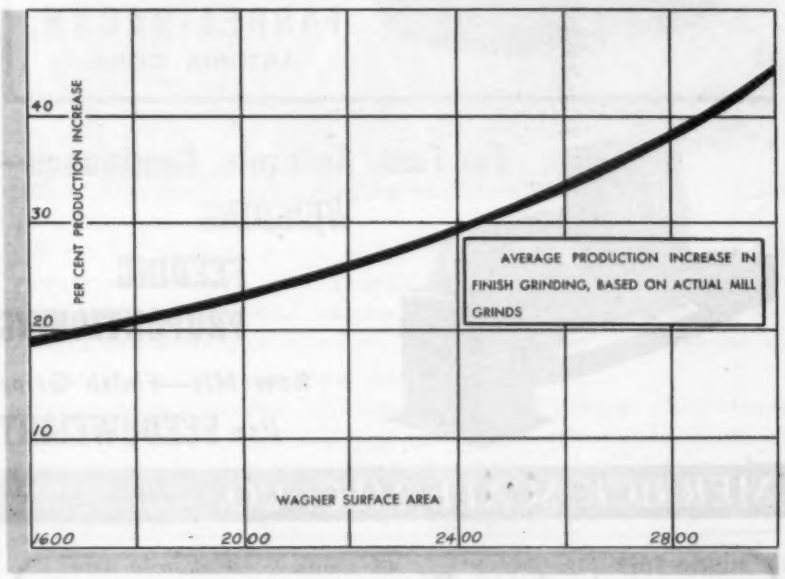
CANADA CEMENT CO., LTD., Montreal, Canada, reported sales for the fiscal year ending November 30, 1945, as running slightly ahead of the same period last year. However, the coal supply situation is reported to be critical.

•

PEERLESS CEMENT CORPORATION, Detroit, Mich., showed a net profit of $72,988 for the six months ended June 30, 1945. This figure compares with $24,526 for a like period ended June 30, 1944.

You can keep
GRINDING COSTS DOWN
***with* TDA**

That's why over 50% of U. S. cement plants use TDA



TDA

WHAT IS TDA?

TDA is a catalyst-dispersing-agent used as a grinding aid. Used in amounts of 1½ to 4 oz. per barrel of cement, it not only increases production, but its presence improves many of the important properties of concrete, such as durability, strength, and impermeability.

TDA is being increasingly used to keep down grinding costs. On the chart you can find the average production increase in finish grinding which operators are obtaining in actual mill grinds. Some use TDA for special fine grinds, and others use TDA when bottlenecks occur in the finish grinding departments. TDA is widely used in making high early strength cements. And many plants use TDA in all their cement.

TDA is *not* an air-entraining agent, but gives increased durability to concrete where freezing and thawing in the presence of calcium chloride is not a factor.

You can use TDA with confidence. It is approved for use in cement and has been field-tested in over one hundred million barrels of portland cement.

Our engineers will be glad to work with you in making trial runs in your own plant. Write to the Cement Division of the Dewey and Almy Chemical Company, 65 Whittemore Avenue, Cambridge 40, Massachusetts.

★ ★ ★

DEWEY AND ALMY CHEMICAL CO.
CAMBRIDGE 40, MASSACHUSETTS

FARREL-BACON

CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants.

Engineering Service

FARREL-BACON
ANSONIA, CONN.

For Fast, Accurate, Continuous—
WEIGHING
FEEDING
PROPORTIONING
Raw Mix—Finish Grind
Use FEEDOWEIGHT

MERRICK SCALE MFG. CO. 188 AUTUMN STREET PASSAIC, NEW JERSEY

The American Way
TO GET EXTRAORDINARY TONNAGE FROM AN ORDINARY OPERATION

The "extras" are engineered into the construction. Reinforced, heavy duty construction with precision machined working parts of the finest alloy steels.

American Crushers are known for their capacity to get extra production where only ordinary production exists before. Great range of reduction, greater output and—day-after-day, year-after year, trouble-free service with low operating costs are made possible by American's exclusive design features.

Send for Detailed Bulletin

American PULVERIZER COMPANY
Originators and Manufacturers of Ring Crushers and Pulverizers
1059 Macklind Ave. St. Louis 10, Mo.

Sand-Lime Brick

Four active sand-lime block and brick plants reported for August, 1945. Reports for June and July were received too late to be published in the last two issues of Rock Products.

AVERAGE PRICE FOR AUGUST

	Plant Price	Delivered Price
Detroit, Mich.	....	$19.75
Saginaw, Mich.	$15.00	....
Grand Rapids, Mich.	....	16.20
Seattle, Wash.	19.50	22.50

STATISTICS FOR AUGUST

Production	1,415,230
Shipments (rail)	.....
Shipments (truck)	1,444,230
Stocks on Hand	318,000
Unfilled Orders	2,130,000

Four plants reporting: incomplete, one reported no stocks on hand and one reported orders oversold so no estimate could be made.

Washing Equipment

Walter Sutton, Niles, Mich., who has been operating a gravel pit producing pit run material, is installing washing and screening equipment preparatory to producing about 200 tons of washed sand and gravel per day. The new plant is expected to be in full operation by next Spring.

CONVENTIONS COMING

American Road Builders' Association, annual convention, Stevens Hotel, Chicago, Ill., January 14-18, 1946.

National Concrete Masonry Association, Annual Meeting, Hotel Sherman, Chicago, Ill., March 12-14, 1946.

National Crushed Stone Association Annual Meeting, Netherland Plaza, Cincinnati, Ohio, Week of January 28, 1946.

National Ready Mixed Concrete Association, Annual Meeting, Netherland Plaza, Cincinnati, O., Week of January 21, 1946.

National Sand and Gravel Association, Annual Meeting, Netherland Plaza, Cincinnati, Ohio, Week of January 21, 1946.

New York State Crushed Stone Association, Inc., and Pennsylvania Stone Producers Association, Hotel New Yorker, New York, N. Y., November 30, 1945.

Manufacturers' News

Caterpillar Tractor Co., Peoria, Ill., announces that John Elwood, general superintendent of the tractor manufacturing division, has been appointed assistant factory manager. Mr. Elwood joined the company in 1926 as a machinist.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has named Arthur R. Tofte manager of the advertising and public relations department. He succeeds George J. Callos, who resigned to become vice-president and account executive for Klau-Van Pieterson-Dunlap Associates, Inc., Milwaukee advertising agency. Mr. Tofte has been a member of the department since 1938, starting as copy chief. He became director of employe publications in 1942 and held that position until his present appointment as manager of the department. Prior to coming to Allis-Chalmers, Mr. Tofte was a member of the advertising department of Bucyrus-Erie Co., and previous to that served as advertising manager of the Sterling Motor Truck Co.

Arthur R. Tofte

The Osgood Co. and The General Excavator Co., Marion, Ohio, have appointed four new distributors: General Machinery Co., Spokane, Wash., will serve the Inland Empire region; American Equipment Corp., Harrisburg, Penn., has taken over the combined Osgood-General franchise for several Pennsylvania Counties; Carl R. Miller Tractor Co., Des Moines, Iowa., will serve the central Iowa territory; and J. S. Innes, Ltd., Leaside, Ontario, Canada, has been appointed to handle the eastern Ontario territory.

The Lincoln Electric Co., Cleveland, Ohio, has opened a direct factory branch sales office at 4427 Manchester Ave., St. Louis, Mo., under the direction of B. J. Brugge as welding engineer and district manager of sales and service.

Bailey Meter Co., Cleveland, Ohio, has announced the appointment of W. E. Dueringer as assistant sales manager and H. E. Weaver as proposition department manager. Both Mr. Dueringer and Mr. Weaver have been associated with the company for over 25 years.

Robins Conveyors, Inc., Passaic, N. J., and its affiliate, Hewitt Rubber Corp., Buffalo, N. Y., have opened a new office in the United Carbon Bldg., Charleston, W. Va., with R. U. Jackson in charge, assisted by H. N. Kepler, sales engineer formerly in Robins' Washington office. Nelson J. Reinhold, who has recently joined the company after 14 years with Cincinnati Rubber Co., will handle Hewitt sales.

Atlas Powder Co., Wilmington, Del., has elected Isaac Fogg president of the company. Mr. Fogg started with the company in 1913 as confidential secretary in the office of secretary-treasurer. He became assistant secretary and assistant treasurer in 1917. He was elected treasurer and member of the board in 1927 and vice-president in 1931. Mr. Fogg succeeds Leland Lyon who has resigned as president and as member of the executive committee but retains the post of chairman of the board of directors.

Bucyrus-Erie Co., Milwaukee, Wis., has appointed A. E. Hudson Co., Peoria, Ill., as distributor for ⅜- to 2½-cu. yd. shovels, draglines and cranes in central Illinois, and Indiana Equipment Co., Inc., Indianapolis, Ind., as distributor in central and northeastern Indiana. Geo. F. Smith Co., St. Louis, Mo., will continue to serve southern Illinois; Great Lakes Supply Corp., Chicago, Ill., north-

BUYING A TRUCK MIXER?

If you are planning a new truck mixer now or later . . . you'll want to investigate the special features that a Rex Moto-Mixer offers you.

You'll want to know about the exclusive Rex Chain Belt Drive that "cushions" road shock and protects the transmission, power plant and other vital working parts of a Rex Moto-Mixer.

You'll want to know about the Hi-Lo mixing action that makes mixing faster and more efficient—the patented method of water entry that introduces water behind the blades, right where the actual mixing takes place—the special Rex Water System that allows water to be drawn off in any quantity desired, on all sizes of mixers—and the unrestricted discharge for *all* slump concrete.

Rex Hi-Discharge Moto-Mixers have been consistently improved, but the basic design has remained unchanged because it was *right*—from the start.

For complete information see your Rex Distributor or write Chain Belt Company, 1649 West Bruce St., Milwaukee 4, Wisconsin.

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OF MILWAUKEE

REX CONSTRUCTION MACHINERY

PULVERIZERS

Hundreds of Installations . . Use Bradley Pulverizers

for the reduction of

AGRICULTURAL LIMESTONE
Cement Materials and all
Dry, Non-Metallic Minerals

CAPACITIES: 1 TO 50 TONS PER HOUR
FINENESSES: 20 TO 350 MESH

BRADLEY PULVERIZER CO.

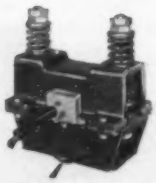
ALLENTOWN, PENNA.

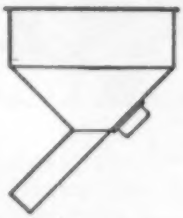
SYNTRON

"Pulsating Magnet"

ELECTRIC VIBRATORS

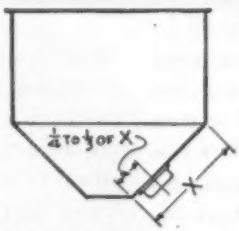
MAKE STUBBORN MATERIALS
FLOW FREELY
THRU BINS, BUNKERS & CHUTES

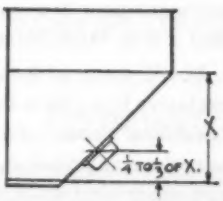




Write for catalog data.

3600 Rheostat-Controlled Vibrations per minute assure free-flowing sand, gravel, rock aggregate, etc. Eliminate pounding and sledging.





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450 Lexington Homer City, Pa.

The Post-War Demand
is for
CONTROLLED CONCRETE

SCZ PRECISION CONCRETE CONTROL
provides it. It includes:

Moisture Meter
Makes a test for moisture content of sand or stone in ONE minute. Accurate to ¼ per cent.

Compensator
Delivers correct DRY weight of aggregates and ADDED water. Makes a graph record of EVERY BATCH.

SCZ CONTROL produces *uniform concrete*. Is always approved by concrete engineers. Has definite sales value. Write for our booklet "Profits in Concrete."

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McLachlen Bldg., Washington, D. C.

A SCOOP
in the Rock Products Field!
"OPERATING TRENDS
Analyzed Geographically"

• Shows locations of deposits. • Lists production problems under new rigid specifications. • Gives solutions of leading producers to these problems.

Series Begins This Month

ROCK PRODUCTS

eastern Illinois, and H. Alter Co., Davenport, Iowa, will serve Mercer, Henry, Rock Island and Whiteside counties. Southern Indiana will continue to be served by Brandeis Machinery & Supply Co., Louisville, Ky., while Great Lakes Supply Corp., Chicago, Ill., will continue to serve the northwest corner of the State.

Hercules Powder Co., Wilmington, Del., has announced the election of William R. Ellis and Mahlon G. Milliken as vice-presidents of the company, also the appointment of Philip B. Stull, vice-president, Mr. Ellis, and Mr. Milliken as members of the executive committe. Mr. Ellis became associated with Hercules in San Francisco, Calif., in 1915 as an explosives sales-service representative. In 1930 he became assistant manager of the San Francisco office and in 1934 he was made assistant general manager of the explosives department. He became general manager of the department in 1936 and a director of the company in 1937.

William R. Ellis

Mr. Milliken has been general manager of the Cellulose Products Department since 1934. He joined Hercules in 1915 as a civil engineer at the Parlin, N. J., cellulose products plant. He became successively resident engineer of the dynamite and smokeless powder plant at Kenvil, N. J., project engineer at Wilmington, and assistant superintendent and superintendent of the Parlin plant. While at Parlin, he invented and developed the Milliken digester. He was elected a director of the company in 1936.

Mahlon G. Milliken

Mr. Stull, a vice-president, who becomes a member of the executive committee, joined Hercules in 1926 with the acquisition of the Virginia Cellulose Co., Hopewell, Va., of which he was president. Subsequently he became general manager of the Hercules Virginia cellulose department. He was elected a director of the company in 1932. In 1937 he became general manager of the Paper Makers Chemical Department and in 1943 a vice-president.

Philip B. Stull

John J. B. Fulenwider has been appointed general manager of the cellulose products department and J. B. Johnson has been named general manager of the explosives department. Both men were formerly assistant general managers of their respective departments and fill vacancies caused by the election of William R. Ellis and Mahlon G. Milliken as vice-president.

Hewitt Rubber Co., Pittsburgh, Penn., has appointed Elliott S. Williams as sales and service representative for the Pittsburgh district. Mr. Williams was formerly with Goodall Rubber Co.

Caterpillar Tractor Co., Peoria, Ill., has announced the creation of a new production division of the manufacturing department under the direction of William Naumann, factory manager.

Klau-Van Pietersom-Dunlap Associates, Inc., Milwaukee, Wis., announces the election of George J. Callos as vice-president and account executive.

ROCK PRODUCTS'

CONCRETE PRODUCTS

and Cement Products

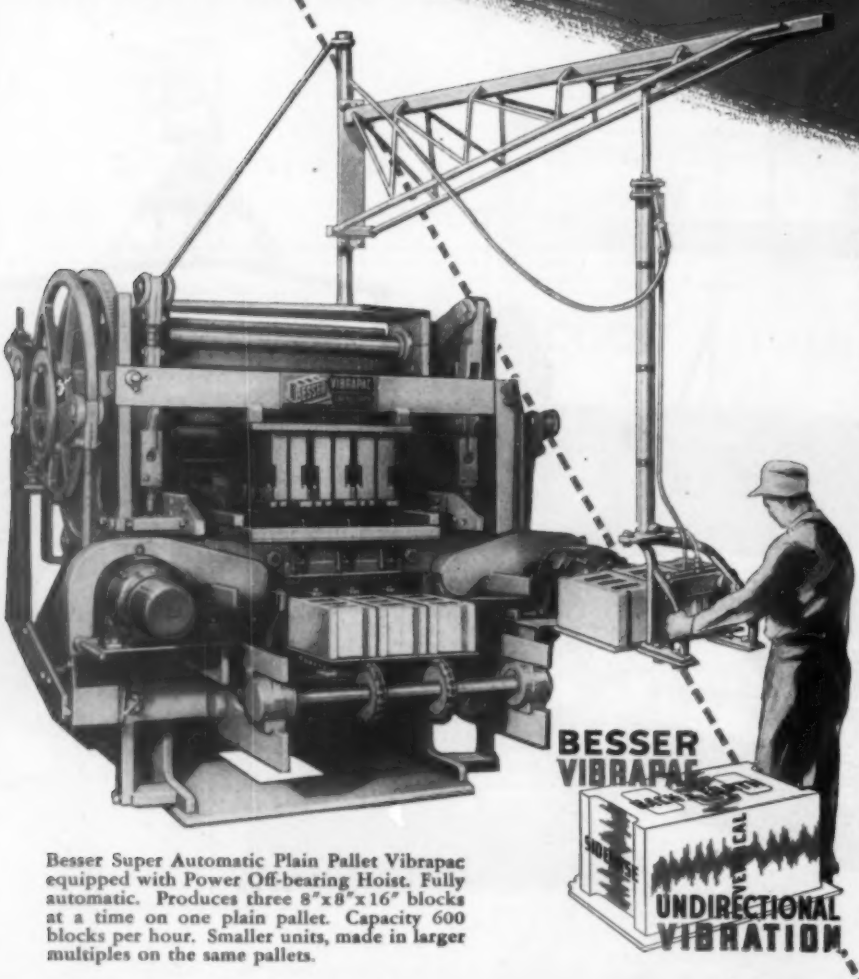
OCTOBER
1945

● Concrete Pipe and Products Co. cinder crushing plant at Richmond, Va.

THE SAVING IN PALLET COST WILL PAY FOR A BESSER VIBRAPAC PLAIN PALLET STRIPPER

-that's why

BESSER *Made Blocks* COST LESS!



Besser Super Automatic Plain Pallet Vibrapac equipped with Power Off-bearing Hoist. Fully automatic. Produces three 8"x8"x16" blocks at a time on one plain pallet. Capacity 600 blocks per hour. Smaller units, made in larger multiples on the same pallets.

In equipping your concrete products plant, consider the TOTAL plant investment, not just the cost of your stripper alone.

The exclusive Besser method of making all units on one set of plain pallets has proved to be the greatest economy factor ever introduced to the concrete products industry.

Besides the economy of pallet cost, there are such other advantages as:

- No large pallet storage space required.
- No extra work changing to another set of pallets to make a different size unit.
- Plain pallets are fed automatically. This eliminates one or more men putting pallets into mold by hand.
- Plain Pallets with three or more blocks on a pallet are handled with power off-bearing hoist at rate of 600 blocks per hour by one man — no lifting — operator simply *guides* the hoist.

Write today for descriptive literature

BESSER MANUFACTURING CO.

ALPENA, MICHIGAN, U. S. A.

Complete Equipment for Concrete Products Plants

Does Your Market Warrant Increased Capacity?

By W. D. M. ALLAN*

W. D. M. Allan

EVERYONE interested in the future of the concrete masonry industry is anxious that builders in every metropolitan area, every crossroad town and every farm community have easy access to an ample supply of high quality concrete masonry units at all times.

Only through the widespread distribution of concrete masonry can the industry reach its full measure of success and render to the building public the low annual cost construction service which concrete masonry has to offer.

But does ample supply and widespread distribution require the establishment of a concrete block plant in every hamlet? Does it require, or will it justify, the establishment overnight of capacity three to five times the present production even in metropolitan areas?

In a section about 80 miles by 60 miles in a certain midwestern state in which the largest city has less than 60,000 population, there are at present 15 plants in operation. The combined full capacity of these plants operating two shifts per day is approximately 15 million units per year. At no time, regardless of war construction, active home building, a vigorous farm market and a considerable volume of shipping business outside the area, has the combined output of these plants exceeded four million units per year. In other words, there is in this area, now, four times as much plant capacity as has ever been used.

In the face of this very large unused capacity, new equipment capable of an additional six million units per year recently has been purchased. Thus, there will be plant capacity for 21 million units per year—five times the maximum production that has ever been reached. In addition, other increased capacity is in the contemplated stage. In order to use the capacity of these concrete masonry plants, every house in the area, year after year, would have to be built of concrete. Such a goal is conceivable but certainly not without a tremendous sales campaign. At present there is very little organized selling in the area and there are no sales programs being planned.

*Director of Promotion, Portland Cement Association.

War vs. Peace Markets

The temptation for the concrete masonry industry to greatly expand its capacity is understandable. Throughout the war period the demand for block has been tremendous. Orders for one-quarter or one-half million block have been common. More customers have been turned down than have been supplied by many manufacturers. Production, production, production, has been the one big worry. It got to the place where a manufacturer hated to hear his telephone ring because it was another customer who would have to be refused. He dreamed day and night of the time when he would have production great enough to take care of the demand.

Now as the industry works out from under the nightmare of war production handicaps, it is only natural for manufacturers to say, "I'm going to get enough plant capacity so that I'll never be caught this way again."

But a word of caution is needed. Capacity and production are two different things. Even during the war construction peak there was ample capacity. If labor and other facilities had been available, including the masons to lay the block, there was capacity, except for curing and drying facilities, to produce more than a billion units a year, yet it is doubtful if more than one-half this amount was produced.

For years ahead, the biggest job confronting the concrete masonry industry will be the development of markets. Yards will soon begin to pile up with block. Competitive materials will be available in abundance. The honeymoon is about over. A customer will be the most welcome thing in the world even if he wants only 500 block for a hog house. Every ring of the telephone will be sweet music.

What Is Your Idea?

This very thought-provoking article by Mr. Allan on the necessity for fitting production capacity to the market undoubtedly will stimulate concrete products manufacturers to analyze their own local situation. It would be helpful to the industry if producers will present their own views on this question and their planning toward that objective as there are many angles to the problem. ROCK PRODUCTS will be glad to present these views in succeeding issues as we believe much of value can be derived by airing the problem from all points of view.—The Editor.

Much Equipment Obsolete But Analyze Market First

Admittedly much concrete masonry equipment is obsolete and new and enlarged plants are needed in many localities, but a sober and critical market analysis should precede the decision to greatly expand plant capacity. The following four questions first should be accurately and honestly answered:

1. During the next few years what is the maximum number of block per year that can be sold in my market? How many can I sell?

2. What is the maximum economical production I can obtain with my present plant operating two shifts a day when necessary?

3. Would it be wiser for me to put in labor-saving devices and other improvements to take the hard work out of various operations rather than to build a new plant with greatly increased capacity?

4. Have I provided a market building and sales program which will dispose of the full capacity of my present equipment and make necessary, increased capacity?

The correct answers to these questions will indicate the extent to which a larger plant is needed.

But again let's remember that merely increasing capacity rarely ever increases production. In normal

(Continued on page 147)

Material Handling

Plant Plans for Concrete Masonry

National Concrete Masonry Association holds two-day meeting to exchange information about proposed plants for postwar business

WHEN concrete masonry producers will travel from as distant points as Albuquerque, N. Mex., Florida, and New York to swap ideas on modern concrete masonry plant design, curing, and other subjects, it is a good test of the interest in the subjects. The two-day meeting called by Secretary E. W. Dienhart for September 21 and 22 was well attended with 103 members and guests present.

The morning session on Friday, September 21 was devoted to an inspection of new concrete products manufacturing plant designs with drawings laid out on tables for inspection and exchange of ideas. Companies showing plans included: Austin Crabbs, Inc., Davenport, Iowa; Domine Builders Supply Co., Inc., Rochester, N. Y.; Cinder Block, Inc., Detroit, Mich.; Illinois Brick Co., Chicago, Ill., Sinter-Lite Corporation, Bronx, New York, N. Y.; Anchor Concrete Products Co., Buffalo, N. Y. Some standard designs were also displayed by Butler Bin Co., Besser Manufacturing Co., and C. S. Johnson Co.

Secretary Dienhart, in opening the afternoon session, called upon Kenneth P. Kerr of Butler Bin Co., to lead off in the discussion. Mr. Kerr said that his company had three basic designs. All these designs started out basically with a 4-compartment bin for aggregates and cement to give flexibility in handling materials calling for concrete of different specification. He pointed out that there were about 10 material handling schemes, dependent upon the method of receiving materials. The size of the bin would be governed by whether the material was brought in by rail or truck; also by distance of haul and types of aggregate.

J. S. Heintz, C. S. Johnson Co., said that his company is working on designs for a fully-automatic plant. Mr. Heintz advocated that block manufacturers consider the possibilities in building a plant for marketing concrete as well as cement. He also looked for some outstanding development of ground storage facilities.

Secretary Dienhart pointed out that the storage problem with regard to cinders is particularly urgent. Mr. Kerr said that his company has several designs for cinder storage.

Haakon Paulson of Besser Manufacturing Co. said that many companies will have to prepare plans to serve markets ranging from two to five million block annually in the postwar building period. Bob Davis of Stearns Manufacturing Co. mentioned the lack of curing facilities as being one of the principal bottlenecks in manufacture. Mr. Kirk of Kent Machine Co. said that his company would have a new block machine in production after the first of the year.

A considerable discussion developed over the question of mixer location. Elmer Strong of Strong Concrete Block Co., LaCrosse, Wis., said that for economy of labor the small block producer should have his mixer on the floor with a skip hoist, but the large producer should have the mixer located on a mezzanine platform to have gravity flow of materials. Fred Reinhold of Anchor Concrete Products, Inc., also held that the mixer should be mounted on a mezzanine platform for more efficient performance and lower maintenance cost.

HUGO FILIPPI of Illinois Brick Co., said that four new block machines eventually are to be installed in the new plant in Chicago, but initially two machines will be in operation. The plant will cover an area 57- x 112-ft., with a 23-ft. ceiling. Curing rooms will be 12 ft. 8 in. by 12 ft. 8 in. and 38 ft. long. The method of curing was developed by Paul Woodworth. Under-cover storage will be provided for 100,000 units with almost unlimited open storage. Steam will be provided by a Clayton steam generator which is an oil-fired, flash boiler of 50-hp. capacity. Straight line production will be provided, and stationary weigh lorries will be used for each mixer as it was believed that the weighing mechanism should be disturbed as little as possible.

JAY C. EHLE of Cleveland Builders Supply Co., said that screw conveyors involved too much maintenance, and said that in his experience the traveling weigh lorry had been successful. Henry Buchholz of Illinois Brick Co., contended the weigh lorry should not be moved as scales were a rather delicate mechanism. JACK CRABBS of Austin Crabbs, Inc., reported that he uses a traveling mixer and had found it very efficient both from a labor and maintenance standpoint. Louis Gelbman of Concrete Units, Inc., New York, N. Y., said he had excellent results from the use of a traveling weigh lorry.

FRANK LEFTWITCH of Concrete Units, Inc., was called upon to describe the new Sinter-Lite aggregate plant. Mr. Leftwitch sketched the flow of material in the plant on a blackboard. He said that the design of the plant is predicated on the fact that bone-dry materials will be used throughout. The product will be a sintered fly ash and slag. Poidometers will be used for proportioning. The cost of the process will be about 30c a cu. yd. The analysis will be similar to volcanic ash and the finished product will be reduced from 45 percent carbon to 15 percent.

Fred Reinhold of Anchor Concrete Products, Inc., told about his plant which will be a three-machine set-up with an inclined conveyor belt to elevate all material from track to hop-

Group of concrete products manufacturers who attended P C A laboratory demonstration of cinder staining test

per. Ample room will be available on the 6-acre site. There will be three 50-ft. mixers, and curing capacity will be 15,000 block. A 24-hr. curing cycle will be used with a 24 hr. or less drying out cycle. Three types of block will be made; sand and gravel, Celocrete, and cinder.

H. H. BLACK of Domine Builders Supply Co., said that his new plant will have two Vibrapacs with provision for a third. A six-beam weigh batcher scale will be used with the beams painted different colors to assure better accuracy. A Hyster lift truck will be used to haul block to storage.

JACK CRABBS of Austin Crabbs, Inc., sketched an outline of their proposed plant which will be 103 x 116 ft., and will have a curing capacity for 18,000 block. He described in considerable detail the use of a traveling mixer which will be incorporated in the new plant design.

Curing Committee Tests

JAY C. EHLE of Cleveland Builders Supply Co., gave a brief report on the work of the Curing Committee, a study which has been in progress for 1½ years. Mr. Ehle reviewed the tests made in the plants of Philip Paollela, Ben Wilk and his own company. Mr. Copeland said the complete testing program will be started immediately. Mr. Ehle said that the best curing room construction was a 12-in. cavity wall, consisting of a 6-in. bearing wall, a 2-in. air space, and a 4-in. insulating wall with a mastic seal. Several methods of exhausting the steam from the curing room were outlined. A new system developed by Industrial Oven Engineering Co., Cleveland, Ohio, was being studied for its heat economy features. A Kinnear rolling steel door with weather-stripping also has been tried on curing rooms. Mr. Gross of Cinder Block, Inc., Detroit, uses exhausted air from curing rooms to preheat the next curing room. Paul Woodworth of Waylite pointed out that with higher temperatures, a smaller capacity curing room is more economical.

A considerable discussion developed over the question of whether some specialized engineering or architectural service could be made available to the industry to which concrete products manufacturers could go for advice in planning a new plant. Austin Crabbs suggested a Clearing Committee on Plans whereby designs of other companies could be distributed for study and constructive criticism. Edgar Otto of Albuquerque, N. Mex., suggested that manufacturers get together and supply an engineering service. It was pointed out by Mr. Buchholz that there was a striking similarity of plans as far as fundamentals were concerned, and he believed that each manufacturer would largely design his own plant calling in the architect to incorporate his ideas in the finished drawings. The small block producer, without much experience, probably would find more need for a special engineering service.

The second day's morning session was largely devoted to a discussion of the relative merits of certain types of machinery to perform under given conditions.

About 22 attended the demonstration Friday afternoon at the P.C.A. laboratory of apparatus developed for determining staining characteristics of cinders, which is described on another page.

Test Your Market

(Continued from page 145)

times increased production depends on increased markets and increased markets come from more effective market building and selling. Only a meager part of the industry's thinking today is aimed at market building and increased sales for tomorrow.

If the industry takes its cue from the immediate past it will likely "go all out" for greater and greater capacity. But if it takes its cue from the probable future, it must "go all out" for concentrated and more effective market building in order to insure sufficient volume for present plant capacity in the face of competition, the like of which the industry never has experienced.

Need More Curing Facilities

The most urgent production need is curing. Few plants have anything approaching adequate curing facilities for full capacity. A brand new plant capable of making three million block per year recently opened with no provision, whatever, for curing. Block made one day were loaded onto trucks the next day, and hauled to the job and laid in the wall before they were 24 hours old. The block received no moist curing to facilitate the hardening of the concrete and they were not dried to reduce their shrinkage. They couldn't possibly have met specifications. The owner's half-hearted excuse was that he had run out of money before he got his curing kilns and drying facilities provided for.

Through the "crime of the 90's," the "sun-kissed block of the 1900's" and the "back yard plants of the 1910's," the concrete masonry industry was continually butting its head against the wall of inferior quality and getting nowhere. Since those times not so long past, the progress that the industry has made has been based on a "quality product, efficiently manufactured and aggressively sold." It took nearly 15 years and thousands and thousands of dollars invested in research and engineering field work to overcome public prejudice resulting from inferior quality.

Sell "Quality"

As postwar construction opens up, quality will again assume first place in making sales. Green block, cracked webs, broken corners will be out. The bright future predicted for concrete masonry will be bright only for those who make quality products and who direct their major efforts toward market building and vigorous, intelligent selling. As we plan for the future, the safe course is to focus attention on markets first and plant second. Too many of us have forgotten something that we once knew very well — the concrete masonry business is primarily a selling business rather than a manufacturing business. Yet most of the industry's effort, ingenuity and thinking revolves around manufacturing.

The building of mailing lists of prospects is just as important as building the plant. Direct mail circulars and letters to architects, contractors, realtors, big buyers and farmers should be sent in good times and bad with the same regularity as materials for production are ordered.

Demonstration houses should be built in various parts of the market, displayed for a few weeks, then sold and another house should be built. The profit on the sale of the house will go a long way toward paying for the necessary advertising.

Demonstration concrete residence floors using concrete units should be built and publicized to educate both prospects and builders.

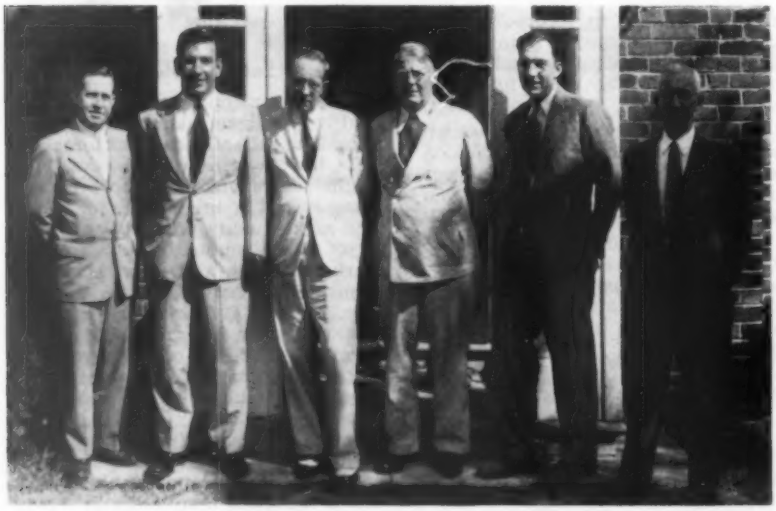
Salesmen should regularly call on builders, architects, realtors, important buyers, prospective home buyers and key farmers whether or not they have an immediate job coming up.

Every year a market building budget should be provided to take care of direct selling, literature, distribution, local advertising — newspaper and radio, building demonstrations and numerous other activities which have proved to be effective sales aids.

Not many businesses fail because of lack of capacity, they fail for lack of markets. But this is no plea for continuing obsolete, inefficient plants; it is no plea for small capacity plants. It's a plea for a reasonable balance between capacity and probable early future production possibilities. It's a plea to put market building first in your thinking, first in your plans and first in the expenditure of available funds.

Change Name

ALLIED CONCRETE PRODUCTS CORPORATION, Norfolk, Va., is the new name of Mid-Atlantic Concrete Pipe & Products Corporation.



Left to right: W. A. Bryson, cost accountant; S. R. Navas, assistant sales manager; J. M. Parrish, president; Harry W. Easterly, vice-president; E. H. Ledford, general superintendent; H. R. Scherer, secretary-treasurer

Concrete Pipe & Products Co., Inc., Richmond, Va., designs unusual cinder crushing plant equipped to produce a continuous flow of material without returning rejects

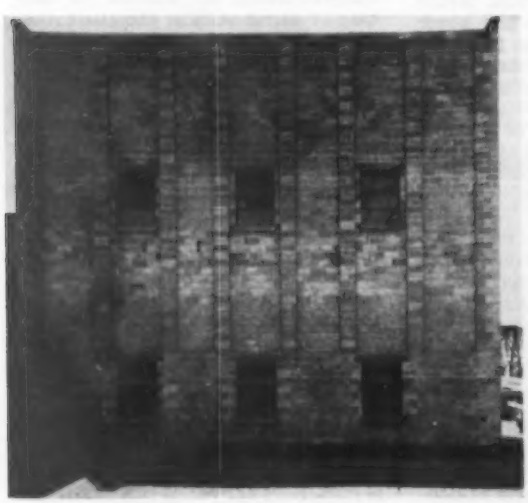
Processing CINDERS for Concrete Products

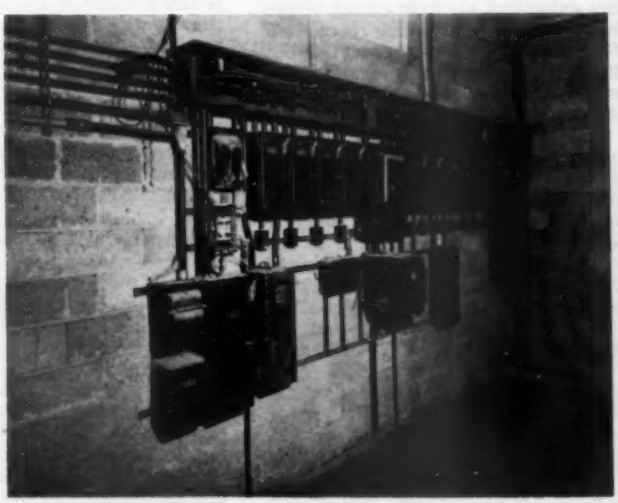
SOME INTERESTING INNOVATIONS have been incorporated in the new cinder processing plant recently placed in operation by the Concrete Pipe & Products Co., Inc., Richmond, Va. The design originated with E. H. Ledford, general superintendent, and was drawn from ideas gained by 18 years' experience, three as installation engineer and 15 years in the manufacture of cinder and other concrete masonry units of all types.

The idea met with the immediate interest of the company, and early in 1942 the design of the plant started to take form. After thoroughly investigating many types of equipment, the preliminary plans were sufficiently completed to make application for priorities necessary for the construction of the building and placement of orders for the mechanical equipment.

Unusual Plant Design

Work started in the fall of 1943. The first step was the construction of a pit 16 ft. deep, 14 ft. wide, and 22 ft. long. Because the water table was 4 ft. from the surface and excavation was made through gravel, many problems arose since it was necessary that the pit be absolutely dry. A 6-in. concrete slab for cribbing was poured, using a prefabricated wooden slip form which was reset to the level of each day's excavation. After completion of the excavation, this slab was lined with three-ply roofing paper and sealed with mastic. Against this a 12-in. reinforced concrete wall was poured continuously in order to prevent joints in the concrete. Since the pit was continually filling with water, a 24-





To the left: Side elevation of cinder processing plant with Deck 3 below floor level. To the right: Master electric control panel for all electrical equipment on Deck 2

Left: Lo-Veyor installation on Deck 1. Right: Head of No. 2 elevator on Deck 4 at top of plant with twin chutes and two-way Lo-Veyor

in. by 4-ft. sump was built from which the water was removed by a centrifugal pump. Continuous pumping controlled the water level while a 6-in. floor slab was poured; it also was lined with three-ply roofing paper and sealed with mastic. On top of this an 8-in. reinforced concrete floor slab was poured. The pit is a success as a result of these precautions.

As shown in one of the illustrations, all walls of the plant building, 40- x 40- x 42-ft., were constructed of cinder concrete masonry units. The thickness of the wall at the base is 20-in., with 12- and 8-in. units alternating. The second deck has a 16-in. wall with 12- and 4-in. units alternating; the third deck, 12-in. units; and the top deck, 8-in. units. Cinder concrete roof slabs were placed on a light type "A" truss, 42-in. centers.

Wall construction was separated from the floor construction by the use of an expansion joint, and steel

(Continued on page 151)

Left: Dings magnetic separator at head of No. 1 bucket elevator to remove tramp iron. Right: Secondary fine crusher on Deck 3 of plant

Detecting Substances in Cinders Which Cause Staining and Popouts

Portland Cement Association holds first demonstration in laboratory with apparatus developed to show cause and prevalence of deleterious substances in cinders

FOR MANY YEARS one of the problems facing the cinder concrete masonry industry has been the elimination of substances in cinders which cause staining and pop-outs. The Portland Cement Association has tackled this problem with tests conducted through its Development Department, and has come up with a report which diagnoses the trouble and prescribes some very effective treatment.

On September 21, a group of about 25 cinder concrete manufacturers and others interested in the problem were privileged to witness at the P.C.A. laboratory in Chicago a demonstration of apparatus developed to detect substances in cinders causing staining and pop-outs. Similar demonstrations tentatively have been planned for Rochester, N. Y., New York, N. Y., Philadelphia, Penn., Washington, D. C., and other cities.

JOHN RUHLING, head of the Cement Products Bureau, spoke briefly to those present at the Chicago demonstration and introduced S. H. Westby of the Bureau who read a report and later conducted a test to show how easily it may be made with comparatively inexpensive equipment.

Recommendations

Briefly summarizing the findings of the report, the tests conducted by the P.C.A. reveal that moist storage of cinders offers a positive means of reducing staining and pop-outs which may occur in cinder concrete masonry. It was indicated that products manufacturers who permit their cinders to remain in stockpiles in a moist condition for at least 30 days after crushing should encounter little trouble with either staining or the most prevalent type of pop-outs.

Tests also were conducted to determine whether some benefit might result from immersing the cinders in a lime bath containing approximately 2 lb. of hydrated lime suspended in 5 gal. of water. Results showed this method to be the most effective of any so far investigated from the standpoint of reducing the staining properties of cinders.

Although this method of treatment would entail somewhat greater cost than ordinary moist storage of cinders, the cost would not be prohibitive. It is possible that the cinders, after being crushed to size, could be sprayed with a dilute milk of lime at the time they are stockpiled and then maintained in a moist condition without further lime treatment. If a cinder does not respond readily to moist storage, the lime treatment may offer an effective means of rendering it satisfactory for use in the manufacture of concrete masonry units.

In nearly every case of staining the cause was traceable to iron compounds which existed in the cinders themselves and not to particles of tramp iron. While the removal of all tramp iron is desired and the practice of passing cinders over a magnetic separator is recommended, this procedure alone will not eliminate staining and pop-outs.

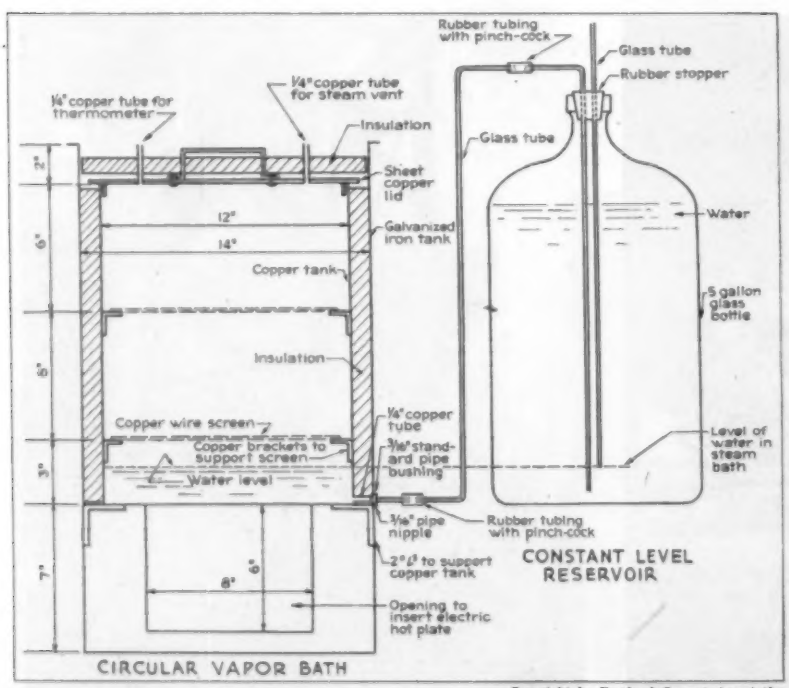
The method developed by P.C.A. for detecting substances in cinders which may cause staining and popouts in concrete masonry applies only to the type of pop-outs caused by iron compounds, and does not provide for detecting of particles of hard burned lime in cinders which, if present, may also cause pop-outs.

Test Procedure

As shown in the illustration, equipment used in these tests consists of an electrically heated vapor bath, which can be built for approximately $50, including a 5-gal. water bottle, rubber tubing, several feet of glass tubing, filter paper, and cheesecloth. The cinder sample for testing should be taken from several different locations of the stockpile. Cinders for the staining test should be of the same size and gradation as those used in block production, and where the plant practices include removal of iron by magnetic extraction before crushing, this practice should be followed in preparing the cinders for test purposes.

The principle involved in this method of testing is the exposure of the aggregate to water vapor at 212 deg. F. for 16 hours, while in contact with white filter paper. Iron or iron compounds in the cinders which are responsible for stains and some types of pop-outs react to form the same products which produce stains in cinder concrete and these products are transmitted to the filter paper where they are readily observed.

In making the test, heavy filter paper 13 in. in diameter is folded to form a cup-shaped receptacle 9 in. in diameter, shaped by folding around a 9-in. diameter circular piece of heavy cardboard. The cup-shaped filter paper is placed in the center of a piece of cheesecloth 24 in. square, and cinders, crushed to size, are placed on the paper to a depth of about ½ in. Another filter paper is placed on top and the process is repeated until three layers comprise the sample. An identifying number



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Apparatus for the determination of staining characteristics of cinder samples

should be marked on filter paper or slip of paper enclosed with the sample. The corners of the cheesecloth are then brought together and tied to form a bag. This sample is then immersed in water for a few seconds and placed on a rack to drain for five minutes. It is then placed in the vapor bath, shown in the illustration, which has previously been heated to 212 deg. F. The cover is placed on the vapor bath, and heating is continued at a constant temperature of 212 deg. F. for 16 hours. After this steaming, the sample is removed from the bath, placed on a clean, flat surface and opened up. The cinders are carefully removed from the filter paper with a spatula or knife blade and the remaining cinders are washed from the paper with clean water.

Observation of the dried filter papers will show the characteristic reddish brown or black iron stains that may be reproduced on the surface of cinder concrete masonry units if cinders from the same stockpile are used. The P.C.A. has devised a "stain index" of cinder samples exposed to 16 hours' vapor bath which are as follows: Very Heavy Stain, 100; Heavy, 80; Moderate, 60; Light, 40; Very Light, 20.

Cinder Processing Plant

(Continued from page 149)

columns were connected to beams anchored to the floor independent of the building walls.

Crushing and Screening Equipment

To achieve low maintenance in the handling of abrasive cinders, vibrating Lo-Veyors were chosen. This equipment includes seven Ajax Lo-Veyors manufactured by Ajax Flexible Coupling Co. This is a vibrating type conveyor, consisting of a pan 18-in. wide and varying in length from 12 to 18 ft., in this case, with the vibrating mechanism operated by a 2-hp. G.E. motor.

Crushing and screening equipment in this plant comprises: three sets of 30- x 21-in. roll crushers; two 4- x 12-ft. single-deck Niagara vibrating screens; a Dings magnetic separator; one belt bucket elevator, 55-ft. centers; and one chain type bucket elevator, 35-ft. centers.

The primary roll crusher is installed in the pit. Cinders through this crusher drop into an 18-in. by 12-ft. Lo-Veyor and flow to the boot of the bucket elevator, 55-ft. centers, passing over the magnetic separator at the head of the elevator for the removal of tramp iron. From the separator, cinders drop to a vibrating screen, adjustable between 15 and 30 degrees, the elevation being controlled by cable and turnbuckle.

Throughs from the screen are dropped by gravity to an 18-in. by 18-ft. Lo-Veyor to floor level. Oversize cinders go to a secondary roll crusher for crushing to a minimum ½-in. size. The product of this crusher is moved over the second vibrating screen, materials passing the screen dropping to a Lo-Veyor at floor level. Oversize goes to a hammer mill which reduces it to minus ¼-in.

Processed cinders flow over another Lo-Veyor to the chain bucket elevator which discharges to twin chutes. These chutes feed a series of four 18-in. by 18-ft. Lo-Veyors which flow cinders to four 180-ton capacity bins adjacent to the mixing floor, and to a series of two 18-in. by 18-ft. Lo-Veyors which flow processed cinders to a 650-ton storage bin connected to the new plant. By the use of three side-discharge gravity chutes, processed cinders can be loaded into trucks for resale. The four Lo-Veyors which flow cinders to the storage bins are so arranged that each can discharge into separate bins or to a Lo-Veyor placed at right angles which conveys processed cinders to railroad cars for resale.

All electric equipment is controlled by a master panel on Deck 2 in the cinder crushing building. Each unit in the processing plant is equipped with start and stop switches. All electrical equipment was installed by the plant electrician, Albert S. Pentecost.

Principal considerations in the design of this plant were: (1) continuous flow, thus eliminating return of rejects; (2) low maintenance cost, all combination switches being interchangeable as well as all parts on roll crushers screens, and elevator buckets.

Mechanical adjustments and finishing touches are still in process, but the resulting operation of the plant more than fulfills the company's expectations.

High Pressure Curing System

The high-pressure, steam cured masonry unit plant, installed early in 1940, has three autoclaves, 6 ft. in diameter with 6-in. thickness and 65 ft. long, and has one Besser Super-Vibrapac. This equipment produces units 80 to 90 percent preshrunk which have a compressive strength of 1000 p.s.i. Autoclaves operate at a pressure of 125 lbs., and at a temperature of 350 deg. F. This operation eliminates storage as all units are routed directly from autoclaves to job sites.

Changing Over Pipe Plant

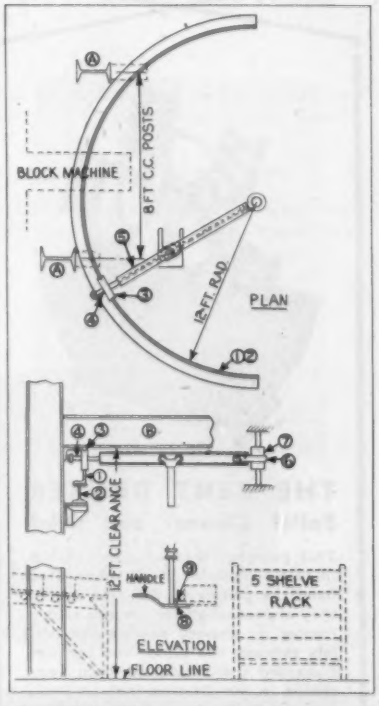
Concrete Pipe and Products Co. was organized in 1925 for the manufacture of machine made pipe from 6-in. to 30-in. diameter, both plain and reinforced. In 1928, the company installed equipment for the manufacture of precast concrete pipe from 36-in. to 90-in. diameter, but it is now about to abandon the manufacture of precast concrete pipe, replacing it with the Hume spun pipe method. This system is now under design and will be installed as one of the company's postwar programs.

The company also manufactures precast septic tanks, mail box posts, precast slabs and joists, right-of-way markers, well casings, as well as many other precast specialties. During World War II, special units, such as precast ship anchors and sinkers weighing from 600 lbs. to 10 tons each, were manufactured, and large contracts for concrete practice bombs for Army ordnance were completed.

Remodels Off-Bearer for Limited Space

A. P. Tamm of The Standard Building Products Co., Detroit, Mich., had the difficult task of remodeling a standard power off-bearer for his block-making machine because of limitations in headroom and restricted space between columns which were a permanent part of the building.

The headroom required for the original off-bearer which included a cantilever beam to support the hydraulic lift, was too much to permit clearance under beams leaving only 12 ft. of head. This supporting member for the lift was therefore redesigned as a simple beam supported at each end, effectively reducing the



Remodeled off-bearer for limited space. (1) Curved I-beam; (2) light angle guide for wheel (3), which floats on shaft (4); (5) pivot beam; (6) steel clamp holding pivot sleeve (7); (8) pallet holding plate; (9) holding dog

required section. As shown in the illustration a standard 6-in. I-beam (1) curved on a 12-ft. radius to allow blocks to be brought out beyond the columns (A) is supported on brackets fastened to these columns, and serves as one end-support for the beam (5) carrying the hydraulic lift. A 2½- x 2½-in. light angle welded to (2) functions as a guide for the grooved 6-in. steel pulley (3) which floats on shaft (4) compensates for variations from true, of the arc described by the guide (2). The pivot beam (5) is a 3-in. Dowmetal light I-beam entailing a considerable dead-weight saving when compared to steel. This feature also reduces riding friction of the wheel. A steel strap or clamp (6) fastened to the beam and clamped to the pivot sleeve (7) completes the new support for the lift.

Another change, however, was found necessary to permit stacking blocks on five-shelf racks. The holding fork on the original design extended about 8 in. below the end of the piston, which when raised to its highest point fell short of clearing the block for the fifth shelf. The fork was removed and a pallet-holding plate (8) fastened directly to the end of the piston thereby gaining nearly 8 in. This plate was made short to facilitate placing of block on shelves, and for that reason a holding dog (9), which slips over the end of the pallet, is required to prevent block from falling off.

Modernize Brick Plant

SAGINAW BRICK CO., Saginaw, Mich., is planning to modernize and enlarge the concrete and sand-lime brick plant as soon as labor and equipment become available. New bins will be added as well as a conveyor system for blending several types of sands.

New Block Concern

NORWOOD BLOCK CO., Albemarle, N. C., has started operations, making both cinder and sand and gravel concrete block. Kermit L. Young and Robert E. Young are the owners. Cinder block are now being made in three sizes.

Sell Products Plant

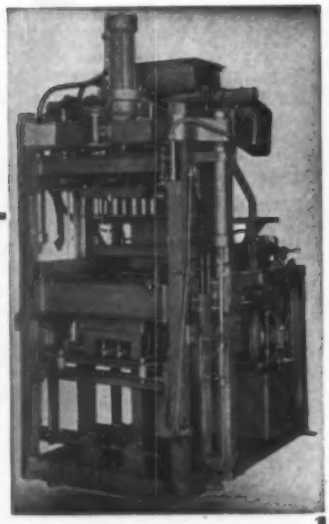
L. P. KRAUSS of Napoleon, Ohio, has sold his concrete products business to The Harper Coal and Supply Co., Napoleon, Ohio. Mr. Harper will continue the business and add a ready mixed concrete plant which is now being built.

Adds Block Plant

TOM FORNICOLA, Sault Ste. Marie, Mich., has added a block plant to his many diverse business activities. He has an extensive trucking business, gasoline stations, and tourist cabins.

Build Boiler House

GRAYSTONE PRODUCTS CO., Seattle, Wash., is building a 16x25-ft. boiler house to cost about $4,000.



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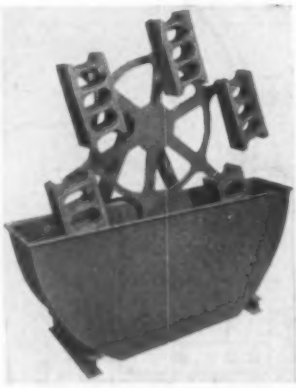

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This patented Dunker keeps pallets in prime condition at all times. Just hang the pallets on the pins and as they are taken off for use the spider rotates by gravity passing the pallets through the tank. You can use discarded crank case oil from your trucks in the Dunker tank.

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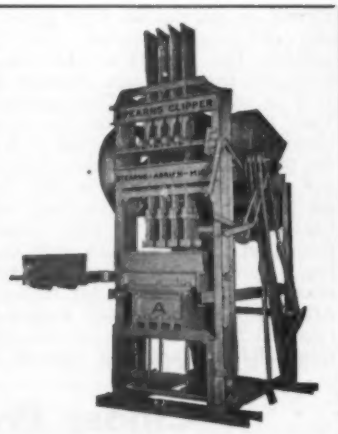

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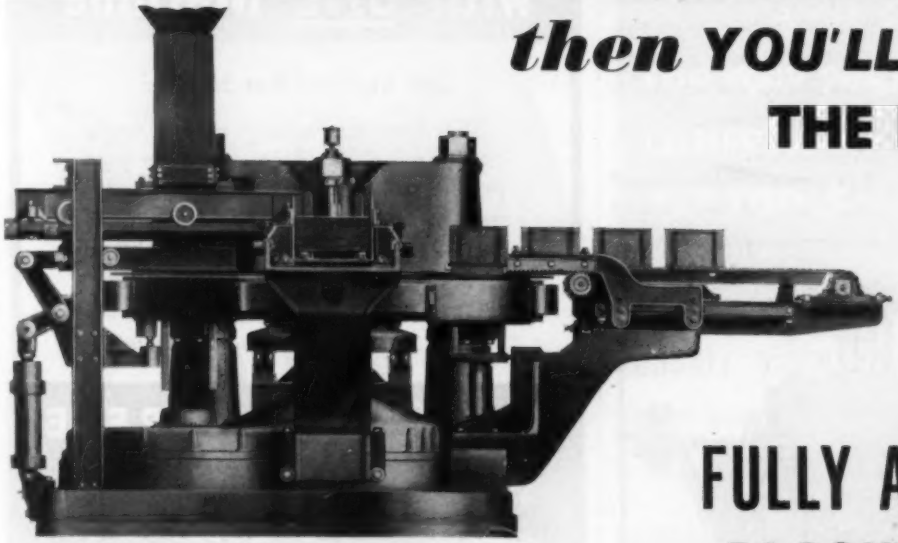

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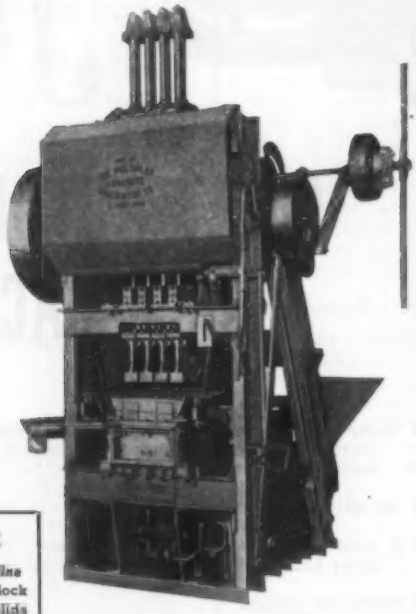

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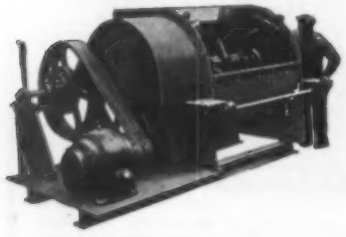

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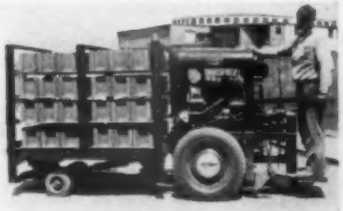
ERICKSON POWER LIFT TRUCKS

STAMINA
SPEED
MANEUVERABILITY

Pneumatic tired, low and high lift fork trucks—platform trucks.



No paved runways needed—Speedy hydraulic platform raiser —Simple controls. Write for complete details.

ERICKSON SPECIAL EQUIPMENT MFG. CO.
109 14TH AVE. N. E. • MINNEAPOLIS, MINN.

T.C. WOVEN WIRE SCREENS

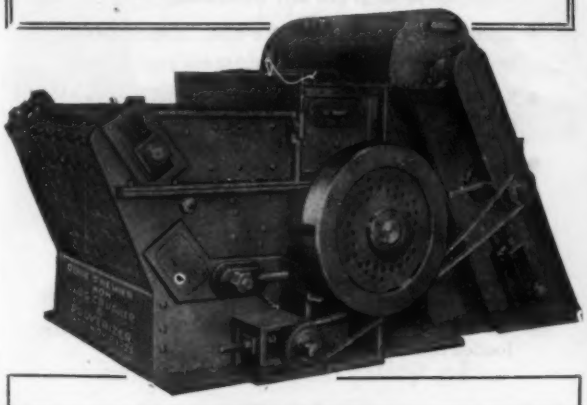
ACCURATE • DURABLE • ECONOMICAL

The reliability of T.C. Alloy Screens has carried them into all parts of the world. Made in Standard and Special Weaves, with Square or Oblong Openings — from 10 mesh, .035" wire on up. Write today for Catalog No. 42.

TWIN CITY IRON & WIRE CO.
35 W. WATER STREET • ST. PAUL 1, MINNESOTA

WHEN PRODUCTION CANNOT LAG

DIXIE GETS THE CALL!



DIXIE
Non-Clog
HAMMERMILLS

NOTE THESE TYPICAL TOUGH JOBS LICKED BY DIXIES

1. Replaced four crushers for high moisture content bauxite . . . cut power in half . . . reduced drying costs . . . increased production.
2. Efficiently crushing clay balls to reclaim phosphate in Florida phosphate plants.
3. Crushing phosphate muck in T.V.A. Tennessee plant.

HERE'S WHY . . .

The Dixie Non-Clog Hammermill is the only crusher with a moving breaker plate. Provides positive mechanical feed. No manual pushing of material needed. Even the most plastic, wet, clayey material will not slow production or clog hammers. This feature alone has saved the cost of 10 men in one company!

And because the Dixie moving breaker plate can be moved forward or backward from the hammer points, quality and size of production can be controlled. This feature provides additional assurance against clogging. These are but two of Dixie's outstanding features. Send coupon below for free booklet, "More Efficient Crushing of Raw Materials" which gives complete facts.

DIXIE MACHINERY MFG. CO.

4202 Goodfellow Blvd., St. Louis, Mo.

GET THE FACTS!

Dixie Machinery Mfg. Co.,
4202 Goodfellow Blvd., St. Louis, Mo.

Please send free booklet on Dixie Non-Clog Hammermills. We want to crush.....

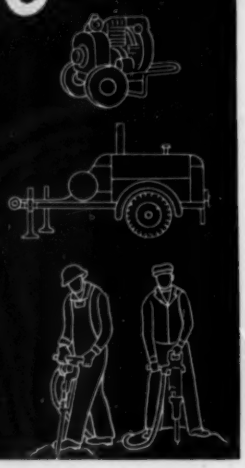
Name.....

Company.....

Address.....

City.....State.....

Quality PACKINGS . . .



FOR YOUR PUMPS
COMPRESSORS
AIR TOOLS

GOODALL V-RING PACKINGS . . .

Highest quality packings for piston and valve stem applications. Will outlast regular coil packings two-to-one and are 50% more efficient under all conditions.

GOODALL SUPERHEAT SHEET PACKING . . .

Compressed rubber and asbestos. For all high temperature, high pressure flange connections. Durable, efficient, economical.

Ask our engineering department for specific recommendations. No obligation.

★ ★ ★

OTHER GOODALL Long Service PRODUCTS

Steam, Air, Water, Suction and Hydraulic Hose; Conveyor, Elevator and Transmission Belting; Boots, Shaft Suits, Coats, Hats, Gloves.

★ ★ ★

Contact our nearest branch or main office for details and prices. Remember . . . GOODALL means "On the Job LONGER!"

GOODALL
RUBBER COMPANY INCORPORATED

THE GOODALL-WHITEHEAD COMPANIES
Philadelphia • Trenton • New York • Chicago
Pittsburgh • Boston • Los Angeles • San Francisco • Seattle • Salt Lake City • Houston

Factory—Trenton, N. J. Established 1870

McLANAHAN Heavy-Duty RECIPROCATING FEEDERS

McLanahan Reciprocating Feeder with 24 x 48 Single Roll Crusher in a Mid-Western Quarry

- Manual labor reduced—handles materials efficiently—reduces power needs.
- Regulates, equalizes and distributes flow of material to or from any machine.
- Eliminates spills, choke-ups, overloads—saves wear and tear on equipment and drives.
- Self-contained, easily and quickly erected, low in first cost.
- Quickly adjustable for any tonnage—stops and starts instantly by clutch or push button control.

McLanahan Feeders can be used in any plant and are built in sizes and capacities for handling all kinds of materials from sand to shovel loaded rock. Write for data.

McLANAHAN AND STONE CORPORATION

Pit, Mine and Quarry Equipment Headquarters Since 1835

HOLLIDAYSBURG, PENNA.

NEW GUARANTEED
mechanical
RUBBER PRODUCTS
available from Stock
for immediate Delivery

Phone...write...wire

CARLYLE
RUBBER CO., Inc.
62-66 PARK PLACE
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CONVEYOR and ELEVATOR BELTING
all widths and plys

TRANSMISSION BELTING
all widths and plys

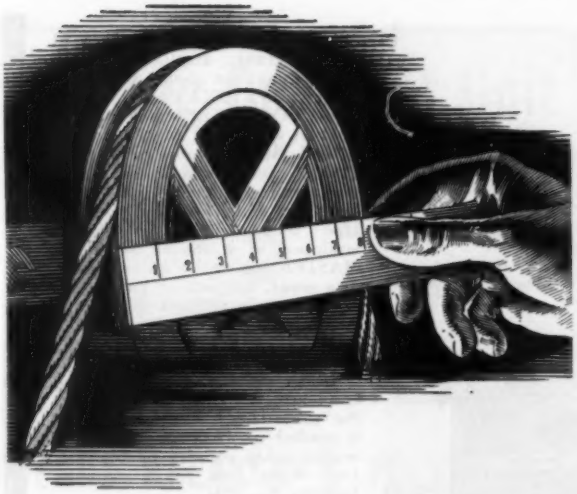
V-BELTS
all sizes

HOSE all sizes
WATER
AIR
STEAM SUCTION
FUEL

write for catalog

. . . and everything rubber for Industrial Requirements

FOR DETAILED LISTINGS SEE THE CARLYLE AD ON PAGE 169



Small Sheaves

call for the flexibility of *PREFORMED* YELLOW STRAND

In a lot of rock-handling equipment, old and new models will have one feature alike: small sheaves—perhaps accompanied by small drums. Either is tough on wire rope. Both should remind you to *minimize* their fatiguing effect by using *Preformed* Yellow Strand.

The *flexibility* of *Preformed* Yellow Strand enables it to hold its own *longer* against fatigue aggravated by severe bending, high speeds and heavy loads. The wires and strands can concentrate on the *external* bending job because *internal* stresses have been virtually neutralized during manufacture.

Along with greater endurance, smooth-running *Preformed* Yellow Strand offers faster installation . . . higher kink-resistance . . . increased safety. Specify *Preformed* Yellow Strand by name—for shovels, draglines, clam shells and other heavy-duty machines.

HAND BOOK FREE: "Industrial Wire Ropes" contains useful facts, tables, pictures. Write for your copy.

Broderick & Bascom Rope Co., St. Louis

Branches: New York, Chicago, Houston, Portland, Seattle
Factories: St. Louis, Seattle, Peoria

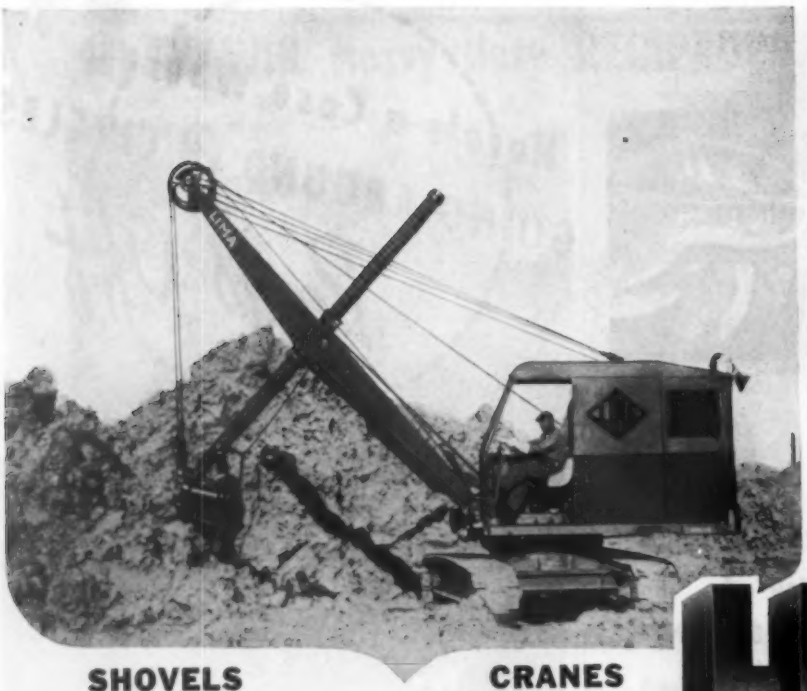
BRODERICK & BASCOM
Yellow Strand
PREFORMED WIRE ROPE

Here's a Case Where GOING AROUND IN CIRCLES *Pays Off*

Seco Screens More Tons Per Hour—Wet or Dry Materials

Advanced engineering—in the form of Seco's patented equalizer assembly. This is the thing that makes possible Seco's true circular motion. This is the thing, too, that gives every inch of the screen maximum screening effectiveness—no matter how the load is put on it. Operators everywhere — who have put Seco vibrating screens to the test on all types of screenings report not only increased tonnages but also long, dependable service with a minimum of upkeep. There is a *right* Seco vibrating screen for your job. Write Dept. B today for free catalog.

SECO SCREEN EQUIPMENT CO., INC.
9 Lafayette Avenue, Buffalo 13, N. Y.



SHOVELS CRANES
PULL-SHOVELS DRAGLINES

When you buy your next ¾ yard shovel, crane, dragline or pull-shovel you can make no better choice than a LIMA PAYMASTER. The PAYMASTER is relatively light in weight yet rugged enough to withstand the most severe conditions encountered in hard digging. It is equipped with an 18' box type boom and 15' tubular type dipper handle. When equipped as a shovel the PAYMASTER can easily be converted to a crane, dragline or pull-shovel or conversely without major dismantling. Such an advantage makes the PAYMASTER an efficient tool, adaptable to many kinds of work. A LIMA shovel, crane or dragline is identified by the Diamond on the cab. The LIMA Diamond is a symbol of 75 years of quality workmanship and dependable service. Write now for a copy of bulletin No. 034C.

LIMA LOCOMOTIVE WORKS, Incorporated
Shovel and Crane Division - LIMA, OHIO

LIMA
Buy War Bonds and Stamps

FOR PERFECT SPREADS USE A BAUGHMAN

The machine that made LIME popular!

BAUGHMAN ALWAYS SETS THE PACE!

Here is the all-around machine you have been waiting for — put it on your truck and use it the "whole year 'round." Spreading lime is only one of the many jobs this model will do!

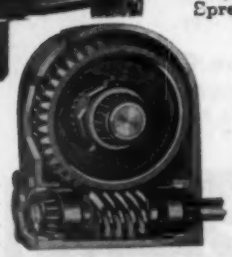
Patented and Patents Pending.

View of a 6½ ton load in a 11-foot body.

MODEL K Wide Throat Drag Chain Type

Steel Body and Undercarriage. Capacities, 5 to 15 tons. Made in 9, 11, 13, 15 and 17 lengths — and 19, 21, 23 and 25 foot lengths with sideboards.

Handles wet or dry lime. Timken straddle mounted bearings, ball and roller bearings throughout. Only two oil-sealed cases and 1 short roller chain drive. Automatic chain feed regulator. Automatic endgates — large endgate for fast dumping. New style automatic drag chain tightener with anti-wrap chain stop. Only 1 patented distributor used. Spreads from 35 to 45 feet depending upon truck speed.



View of our heavy, cut steel and bronze, 15 to 1, Gear Reduction. All gears are straddle mounted between Timken tapered roller bearings, sealed against dirt and running in a bath of oil. Simple, efficient, trouble-free — will give years of service.

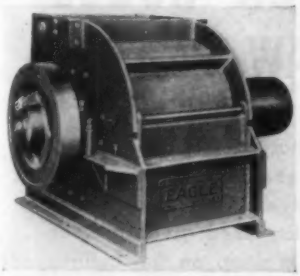
Other Baughman "Hi-Speed" Equipment

Model C, Cinder and Chip Spreader
Model N, Dump Body Lime Spreader
Model P, Phosphate Spreader
Motor or Farm Tractor Drive Spreader
Model F, Flat Bed Type Spreader
Model J, Transfer Unloader or Dump
Model L, Car Unloader
Model M, Car Unloader

Ask for recommendations—we have a reliable distributor near you.

manufactured exclusively by
BAUGHMAN MANUFACTURING CO., Inc.
Factories • JERSEYVILLE, ILLINOIS

A Strong Compact Unit



with a Wide Range of Reduction

EAGLE

IMPACT BREAKER & PULVERIZER

The Eagle is a modern streamlined unit, operating with heavy, reversible, free-swinging hammers, having four adjustments for long wear—the machine selected by discriminating producers.

- One-piece welded steel frame reduces weight to a minimum, yet provides increased strength.
- Easily adjustable, heavy manganese steel breaker plate, permits production of different sized material as required.
- Heavy, reversible manganese steel hammers and heavy special alloy steel shaft.
- SKF double-roller, self-aligning bearings, completely protected from dust by labyrinth seals.

LOADS 2 to 3 TONS PER MINUTE

Eagle Truck-Mounted Loaders operate at variable speeds, loading 2 to 3 tons per minute, with wide loading ranges. All operations are easily performed by one man.

Write for Detailed Literature

EAGLE CRUSHER CO., INC.

Galion, Ohio

The Originators of One-Piece Electrically Welded Crusher Frames

EAGLE

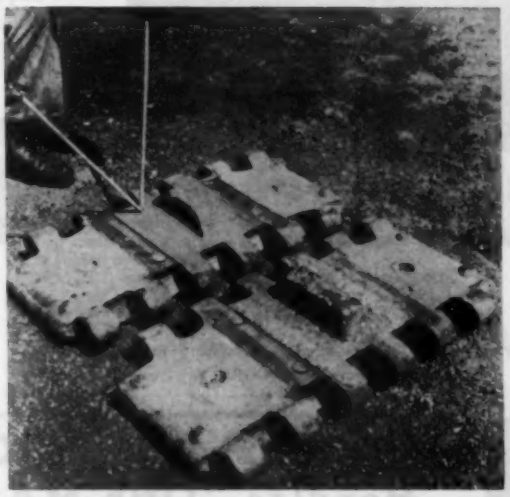
JAW CRUSHERS
IMPACT BREAKERS
PULVERIZERS
CONVEYORS
LOADERS

"TWO-TONE" ALLOYS REDUCE MAINTENANCE COSTS

by reducing

DOWN TIME

of Equipment when Repairing or Rebuilding



The above illustration shows the method of rebuilding crawler type tractor treads. The section in the foreground has been reconditioned by using TWO TONE T. H. to rebuild and hardface a tractor track section.

"TWO TONE" T. H.

Special medium alloy cast rod containing 12% chrome, 2% molybdenum boron and titanium with carbon at 2% for use in the "Two Tone" process to deposit large amounts of a tough and hard hardfacing alloy for sliding and flat impact and medium abrasion.

"TWO TONE" H. C.

Special 1¼% carbon medium alloyed rod containing chromium, molybdenum and vanadium with boron for use in the "Two Tone" process to deposit a very tough medium alloy, medium carbon high strength steel for repairing worn high carbon steel parts such as tractor rails, idlers, locomotive drive wheel flanges, rail ends, tires, etc.

MANGA-TONE N. M.

Special cast—nickel-manganese alloy containing 10% nickel, 30% manganese with vanadium, carbon at 1½% to be used in the "Two Tone" process ONLY for repairing and rebuilding all cast manganese steel parts such as: shovel teeth, pump impellers, frogs, cross overs, tractor bottom rollers, tractor treads.

Write for Bulletin No. 7

RESISTO-LOY

COMPANY, GRAND RAPIDS 7, MICHIGAN

7 TIMES *MORE* SERVICE

STROH
CRUSHER ROLLS AND JAW PLATES

Service seven times as great as that on the material replaced—that is what the records show for crusher rolls and jaw plates made with Stroh Steel. They give longer service for four reasons—Stroh Alloy used gives greater wear resistance. The Stroh Alloy is deep on the cutting edges and shallow in the pits of the corrugations. It cannot peen or spall. It cannot break because the body is Soft Steel.

Specify* STROH STEEL *for

- Fewer Replacements
- Smoother Operation
- Lower Production Costs

Write today for our catalog describing fully the advantages of Stroh Alloy.

Stroh Alloy **is made by *The Stroh Process*, an exclusive method of casting the finest alloy steel together with ordinary soft steel in one integral casting. This gives the casting a stratum of *wear resistant* Alloy Steel. The rest of the casting remains a ductile material and cushions the impact load to which wearing surface is subjected.**

STROH PROCESS STEEL CO.

1428 HIGH STREET N. S. **PITTSBURGH 12, PA.**

The Williams "SLUGGER" Crusher and Pulverizer Handles "ONE MAN" Stone ● Saves Sledging

Also Makes 1¼", ¾" or Agricultural Limestone in One Operation

CUTAWAY VIEW of "Slugger" showing heavy duty hammers, liners and discs.

By reducing large rock to 1¼", ¾" or agricultural limestone in one operation, the "Slugger" has enabled operators to produce these sizes at a low cost per ton and with small investment.

Features include—Manganese steel hammers, heavy duty bearings, adjustable breaker plate, hammer adjustments overcome wear, economical to operate.

The "Slugger" is built in Seven Sizes — from 30 to 150 horsepower — write for illustrated bulletins today.

The Williams Patent Crusher and Pulverizer
800 St. Louis Ave., St. Louis, Mo.

SALES AGENCIES
CHICAGO 37 W. Van Buren
NEW YORK 15 Park Row
PHILADELPHIA 11 N. 4th Street

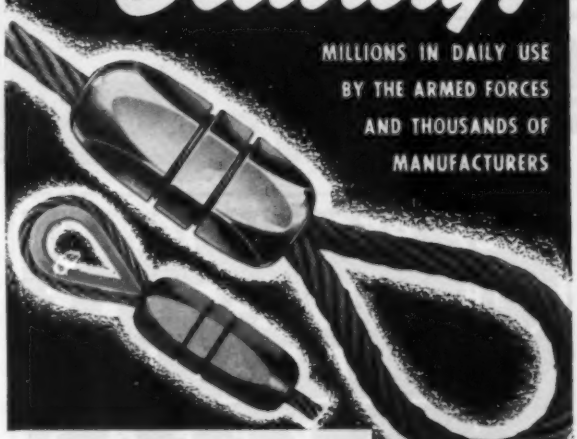
OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

WILLIAMS

PATENT CRUSHERS GRINDERS SHREDDERS

A BETTER METHOD OF HOLDING WIRE ROPE *Securely!*

MILLIONS IN DAILY USE BY THE ARMED FORCES AND THOUSANDS OF MANUFACTURERS



SAFE-LINE WIRE ROPE CLAMP

Eliminates Splicing and Serving

Much faster—saves time—reduces cost. Minimizes rope or sling breakage. Holds tight thimble.

Easy to Use, Easy to Re-adjust

No highly skilled labor or special tools required. Easy to adjust as rigging stretches.

Outpulls Strongest Rope—Never Slips

¾" 6 x 19 Improved Plow Steel Wire Rope broke at 46,850 pounds on Riehle Testing Machine. SAFE-LINE Clamp *held.*

Economical—Use Again and Again

Thousands of the first SAFE-LINE Wire Rope Clamps made are still in use. Low initial cost.

Safe—Prevents Personal Injury, Mental Hazards

Exposed needle-sharp wire ends safely enclosed inside of clamp protects against cutting or scratching hands and arms. Smooth rounded shape prevents catching clothing or fouling.

Replacement Guarantee

Every SAFE-LINE Wire Rope Clamp carries a replacement guarantee against breakage and fracture.

APPROVED BY UNDERWRITERS LABORATORIES
APPROVED BY CIVIL AERONAUTICS ADMINISTRATION

FOR ROPE SIZES ⅛" TO ¾"

Never Slips

FORGED AND MASTER COINED TO FIT ROPE

Double spiral splines fit each wire and strand, provide a perfect, secure GRIP on rope. Pressure equally distributed over large area eliminates cutting action. Locking lugs automatically line-up threads.

WRITE FOR DESCRIPTIVE PRICE LIST FOLDER

NATIONAL PRODUCTION COMPANY
4583 ST. JEAN AVENUE • DETROIT 13, MICHIGAN

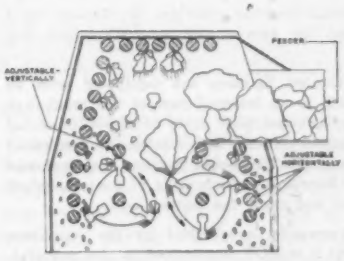
2 *CRUSHERS IN* 1

FOR PRIMARY AND SECONDARY

REDUCTION

The New Holland Model 3030 Double Impeller crusher reduces run-of-quarry stone as large as 30 in. to an optional minimum of 80% minus 1 in. in one operation. Crushes 100 to 150 tons per hour with as little as 100 horsepower. Extreme simplicity and ruggedness keeps operating and maintenance costs to an astonishing low. Wearing parts designed for quick, inexpensive replacement. Weight only 12 tons. Write Dept. RP-8 for details.

HOW IT WORKS



Impacting action of the two gigantic impellers, operating clockwise and counterclockwise, strikes the stone in mid-air as it enters the crusher. Material is thrown upward against the grate bars and rebounds to the impellers. This process continues until the stone is reduced to the required size when it passes around the impellers and out through the discharge openings. Impellers travel at adjustable speeds of 300 to 900 rpm. Size of finished product is easily and quickly controlled. Manganese steel impeller bars have four striking faces and are made to be reversed when worn.

N. H. Horizontal Vibrating screens designed for the most difficult screening jobs. Have many superior features.

Let N. H. Engineers plan your set-up for producing agricultural limestone or crushed aggregates. The most economical way is with the Model 3030 and other N. H. equipment.

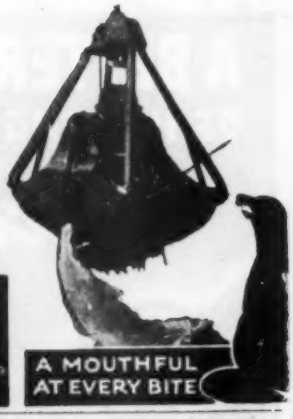
NEW HOLLAND MACHINE CO.
New Holland **Pennsylvania**

Up from the Sea

Owen dredging buckets are designed to come "up from the sea" with "a mouthful at every bite" and protected against the destructive action of water, mud and grit.

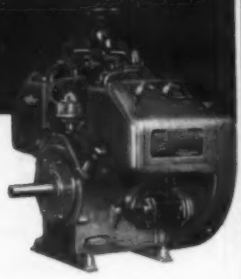
The OWEN BUCKET Co.
6040 Breakwater Avenue, Cleveland, Ohio
Branches: New York Philadelphia Chicago Berkeley, Cal.

OWEN



All WISCONSIN HEAVY-DUTY Air-Cooled ENGINES

are equipped with EXTENDED SHAFT for Power Drive



You have no outboard bearing problem in rigging up a power take-off when the power unit is a Wisconsin Air-Cooled Engine.

All Wisconsin Air-Cooled Engines are equipped with an extended shaft, which is an integral part of the crankshaft proper. Drive pulley, sprocket, gear drive or direct-connected coupling can be attached directly to this extended crankshaft . . . because all Wisconsin Air-Cooled Engines are equipped with tapered Roller Bearings at both ends of the crankshaft to take up end-thrust and carry the power load.

This is a feature frequently overlooked by the purchaser of an engine . . . but it is NOT overlooked in the manufacture of Wisconsin Engines . . . built for efficiency and dependable service in *all* ways.

Most H.P. per pound

WISCONSIN MOTOR Corporation
MILWAUKEE 14 WISCONSIN U S A
World's Largest Builders of Heavy-Duty Air-Cooled Engines

KEEP PRODUCTION UP WITH LINK-BELT VIBRATING SCREENS

Made in a number of standard sizes — single or multiple decks, with or without enclosures.

You can depend on Link-Belt screens to do just that kind of a job. In their design, we give you the benefit of our wide experience in solving all kinds of screening applications. Made in a number of standard sizes. Get Link-Belt Screens and keep production up!

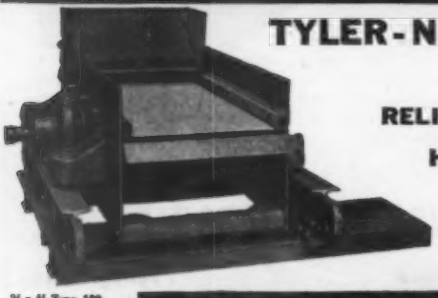
LINK-BELT COMPANY, Philadelphia 40, Chicago 9, Atlanta, Indianapolis 6, Pittsburgh 19, Cleveland 13, New York 7, San Francisco 24, St. Louis 1, Toronto 8. Other Offices in Principal Cities.

From the SMALLEST to the LARGEST TONNAGES

TYLER-NIAGARA SCREENS

are

RELIABLE
HIGH CAPACITY
EFFICIENT
ECONOMICAL



2' x 4' Type 100 Tyler-Niagara Screen

8' x 14' Type 900 Tyler-Niagara Screen

THE W. S. TYLER COMPANY, Cleveland 14, Ohio

Geared to Take the Toughest "Grind"!

Hendrick High Carbon, Heat Treated Steel has what it takes to withstand continuous abrasive action. Heat treated for extra hardness, this special alloy steel is the "economy choice" for long, satisfactory service in screening highly abrasive materials.

Hendrick High Carbon, Heat Treated Steel Perforated Plate is supplied in any desired shape and size of opening—in any gauge required for screening.

HENDRICK MANUFACTURING CO.

47 Dundaff St., Carbondale, Pa.

SALES OFFICES IN PRINCIPAL CITIES

PLEASE CONSULT TELEPHONE DIRECTORY

Makers of Elevator Buckets of all types. Mitco Open Steel Flooring. Mitco Shur-Site Tread and Mitco Armorgrids. Light and Heavy Steel Plate Construction

UNIFORM SEPARATION AT ALL TIMES

The new model GAYCO Centrifugal Air Separator always produces the same uniform products at the same settings. It is easily adjusted to deliver fine material within a range of 40 to 400 mesh.

- Greater Capacity
- Cleaner Tailings
- 98% Through 325 Mesh
- 25% to 30% Greater Recovery of Fines
- Not affected by Variation in Speed or Rate of Feed

Manufacturers also of "Reliance" Crushers, Screens, Elevators, Conveyors, Bin Gates, Grizzlies. Complete Crushing, screening, and washing plants for crushed stone, sand and gravel.

Universal Road Machinery Co.

Rubert M. Gay Division, 117 Liberty St., New York 6, N. Y.

Canadian Representative: F. H. Hopkins Co., Ltd., Montreal

FACTORY & LABORATORY, KINGSTON, N. Y.

NEW LEADER Truck Body Type LIME SPREADERS

Can Now Be Purchased Without Triple AAA Certificates or Priority

THE above picture shows a rear view of the new model NEW LEADER marl and lime spreader. This spreader is equipped with an extra wide conveyor and two distributor discs and is strictly a one-man spreader. You will be able to haul wet lime or marl and, due to the large opening in the back end of the spreader, material will always feed onto the distributor disc evenly.

This spreader has many outstanding features. Both gear boxes driving the distributor discs are equipped with cut steel gears and ball-bearings running in a dust-proof and oil-tight gear case. The large gear box driving the wide chain conveyor is equipped with a steel ring gear and pinion and a thrust bearing also running in a dust-proof and oil-tight gear case. Bearing hangers are placed underneath the distributor discs; these are also equipped with ball bearings. This helps to carry the weight of the distributor discs and the load, the weight not being suspended from the gears in the small gear box. With this arrangement you are assured longer lived gears. The framework of the spreader is of hardwood.

These spreaders can now be purchased without priority or certificates of any kind. Write us for any additional information, also prices.

Write today for latest catalog

HIGHWAY EQUIPMENT COMPANY, INC.

We now have territory available for dealers. Write us for details.

Manufacturers of the World's Most Complete Line of Spreaders, Including Lime Spreaders, Sand and Cinder Spreaders, Chip Rock, Clay and Dirt Spreaders.

CEDAR RAPIDS, IOWA, U. S. A. Phone 32017-32018

THOUSANDS of men in industrial plants, mines and mills all over the country are doing just what this man is doing. They are cutting costs by repairing conveyor belts with Flexco HD Rip Plates.

WRITE TODAY FOR BULLETIN F-100 that shows how easy it is to repair rips, to strengthen soft spots and to put in patches by using Flexco HD rip plates. The bulletin also shows how to make tight butt joints in both conveyor and elevator belts with Flexco HD Belt Fasteners. These fasteners are made in six sizes. Furnished in special analysis steel for general use and in various alloys to meet special conditions.

Flexco HD Rip Plate

Flexco HD Belt Fastener

FLEXIBLE STEEL LACING CO.

4684 Lexington St., Chicago, Ill.

FLEXCO HD BELT FASTENERS

Sold by supply houses everywhere

NO Arching Clogging Hanging-Up

"BRANFORD" PNEUMATIC VIBRATORS

"Branford" Vibrators are a highly efficient means of keeping materials flowing freely in Hoppers, Bins, Chutes, Pipes, Screens, Etc.

"Branford" Air Vibrators are low in cost, easy to install, economical in operation and maintenance. Only one moving part.

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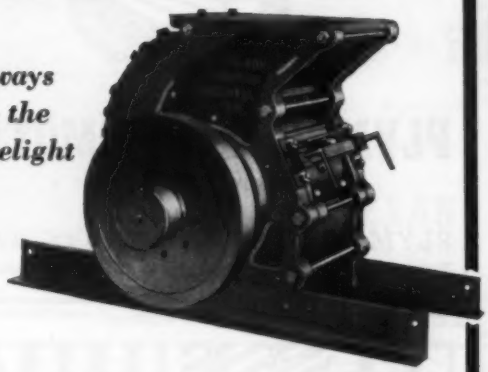

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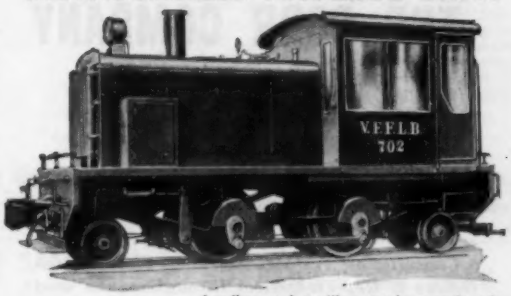

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Included in price are:
2 eccentrics (one babbitted)
1 new concave ring
1 new set of oil packing rings

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30 H. P., Type 27/3, with direct connected 22½ KVA. A.C. Generator, Exciter and Automatic Voltage Regulator.
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ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"
42"	5	1/8"	1/16"
36"	6	1/8"	1/16"
30"	6	1/8"	1/16"
30"	5	1/8"	1/16"
24"	5	1/8"	1/32"
24"	4	1/8"	1/32"
20"	5	1/8"	1/32"
20"	4	1/8"	1/32"
18"	4	1/8"	1/32"
16"	4	1/8"	1/32"
14"	4	1/16"	1/32"
12"	4	1/16"	1/32"

Inquire For Prices - Mention Size and Lengths

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HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

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"A" WIDTH All Sizes | "D" WIDTH All Sizes
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	25 "	7.50
	35 "	10.50
	40 "	12.00
1½"	50 "	15.00
	25 "	10.00
	35 "	14.00
	50 "	20.00

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I.D. Size	Length	per Length	Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 "
¾"	25 "	6.25	2.50 "
	50 "	12.50	2.50 "
1"	25 "	10.00	3.50 "
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2 Yd. OWEN Type S Material Handling.
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20 Ton LIMA, 750 Diesel, 65 Ft. Boom.
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25 Ton LINK BELT K-48 Electric, 70 Ft. Boom.

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46—KOPPEL, 1¼ Yd. 24 & 30 In. Ga., V Shaped.
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5 No. 10, 25, 37 & 49 Kennedy.
18 in. 24 in., 30 in., 36 in. & 48 in. Symons Disc.
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Head & Tail—Pulleys—Takeup for all sizes.
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36 In.x20 Ft., 3 Ft.x30 Ft., 4 Ft.x36 Ft., 54 In. x30 Ft., 42 In.x24 Ft., 5 Ft.x30 Ft., 5 Ft.x16 Ft., 5 Ft.x80 Ft., 6 Ft.x80 Ft., 6 Ft.x20 Ft., 6 Ft.x70 Ft., 10x20, 7½x100 & 8x110 Ft. Kilns.

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3 cyl—13½″ x 18″—300 RPM
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Roller tubes, 236—1¾″ x 5′, ferrules (new).

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Pullshovel Attach. for Lorain 75A or B.
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P&H Shovel Model 33 with Wahesha motor.
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37½ Kennedy with 50 hp. motor, built in flywheel.
Barber Green bucket loader on caterpillars with 4 cylinder Buda gasoline motor, self starter, worm feed, like new.
Perfect discharge elevator 30′ center with 12″x7″ buckets and Rex 111 chain, complete (no steel housing).
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120′ center 30″ Belt Conveyor with 6″ channel iron frame with or without belt.
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80′ center 18″ Belt Conveyor with 6″ channel iron frame with or without belt.
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REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Traylor 36″ TZ, 8″, 10″, 13″. Super. McCully 6″x10″. Newhouse 5, 7, & 10″. Symons Cone & Disc Ty. 2′ to 4′.
ROLLS: Allis-C. 12½x12, 36x10, 40x15, 54x24 & 72x30. Fairmount 36x60 & Jeffrey 24x24 to 36x54 single roll. Cornish 36x14 & 42x16, Etc.
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Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryer, Derricks, Elevators, Excavators, Generators, Hoists, Kilns, Draglines, Drag Scrapers, Dredges, Drills, Engines, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

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200 H.P. Power Unit—Model 6ES-668
6 Cylinder, 514 RPM, Clutch; Heavy Steel Skid Mounted—Stock Delivery

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1—Traylor Gyratory Crusher, First Class Cond. Size No. 410 T.Z. Serial No. 27784.
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Following D. C. Electric Motors:

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30 ton Vulcan std. ga. Steam Loco.
7′x8′ Stevenson Pebble Mill, Buhrstone lined.
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⅛ and ½ yard Universal Shovels.
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Loco. Cranes—12½ to 40 tons capacity.
Diesel, Elec., and Steam Drags, 2 and 3 yds.
Diesel Locos.—8-16-20-25-30 and 35 tons.
Diesel Tractors-Dozers, AC HD-10, Int. TD-18, Cat. 50; 12 & 16 yd. Athey wagons; Scrapers.
Athey Mobiloader, for Cat. D8 or RD8 tractor.
Compressor—950′ 2 stage, cpld. to Syn. motor.
Steel Sectional Barge, 100x26x5′. Like new.
4x8 Vib. Screen; Clam Buckets ½ to 5 yds.

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120 H.P. Heavy Duty, 90 KVA
3/60/240 Complete

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Lambert Elec. Whirley 100 ft. boom, 2 yds. cap.
Marion 371 shovel-crane, 1¾ yd. cap.
Monighan-Walker 3½ yd. dragline, elec., rebuilt, guaranteed.
P & H Model 765, 2 yd. Diesel shovel, rebuilt.
Marion 37 shovel, steam, 1¾ yds.
Marion Model 450 steam shovel, 1¼ yds.
Marion Model 450 gas-elec. shovel, 1¼ yds.
Marion Model 331 gas shovel.
P & H Model 600 crane, gas.
P & H 600 crane, 1 yd. capacity.
P & H 650 shovel and dragline, 1¼ yd. capacity.
P & H 205A, 8 ton truck crane.
P & H Model 100 6 ton truck crane.
Universal 7½ ton truck crane on Mack truck, rebuilt.
Bucyrus-Erie 50B steam crane, 65 ft. boom.
Bucyrus-Erie 50B steam crane, 70 ft. boom.
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Osgood shovel, 1¼ yds., gas.
Marion Model 371, 1¾ yd. shovel and crane.
Bucyrus-Erie Model 37 1¼ yd. shovel.
Gantry crane, 5 ton, 46 ft. span, 15 ft. overhang.
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Wiley-Whirley Portal crane, 25 tons cap. at 35 ft. radius.
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Allis-Chalmers W8 tractor with bulldozer.
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2 Dempster Dumpsters with 20 buckets.
Bucket Elevator, vertical, 35′, 22″ buckets.
B.S. 12 ton, 3 wheel Roller, gas.
B.S. 10 ton, 3 wheel Roller, steam.
Gallon 10 ton, 3 wheel Roller.
Dredge, 12″ Diesel Hydraulic.
Dredge, 10″ Diesel Hydraulic.
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Allis-Chalmers Cent. Pump elect'c, 3500 GPM.
Drill Steel, 1¼″, bitted and shanked.
500 Drill Bits, 1-R and Timken. Various sizes.
1-R Model 50 Drill Sharpener, complete.
20 Steel Stone Skips, 2-3 yds. cap.
Several dredge pumps available from 6″ up.
Pulding Trusses, 10, span 66 ft. Excellent.
Concr'e block plant, 3500 blocks per day.

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Butler complete ready-mix plant, 450 tons aggregate 300 bbls. bulk cement. A modern plant in all respects, including Whirley crane.
Beaumont Birch 210 bbls. cement bin.
Jaeger 2HCE high discharge 2 yd. truck mixer.
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Erie Batching Plant, 50 tons, aggregate, 95 bbls., bulk cement bin.
Johnson 200 yd. Octo Bin, 4 compt.
Fuller Kinyon Bulk Cement Unloader, portable.
Koehring 34E Dual Drum Paver.
Fuller Kinyon Type H cement unloader.
Erie Batching Plant, 2 compt. aggregate, one cement.

CRUSHER—CRUSHER PLANTS

Roll, 54x24, 54x20, 48x36, 30x24.
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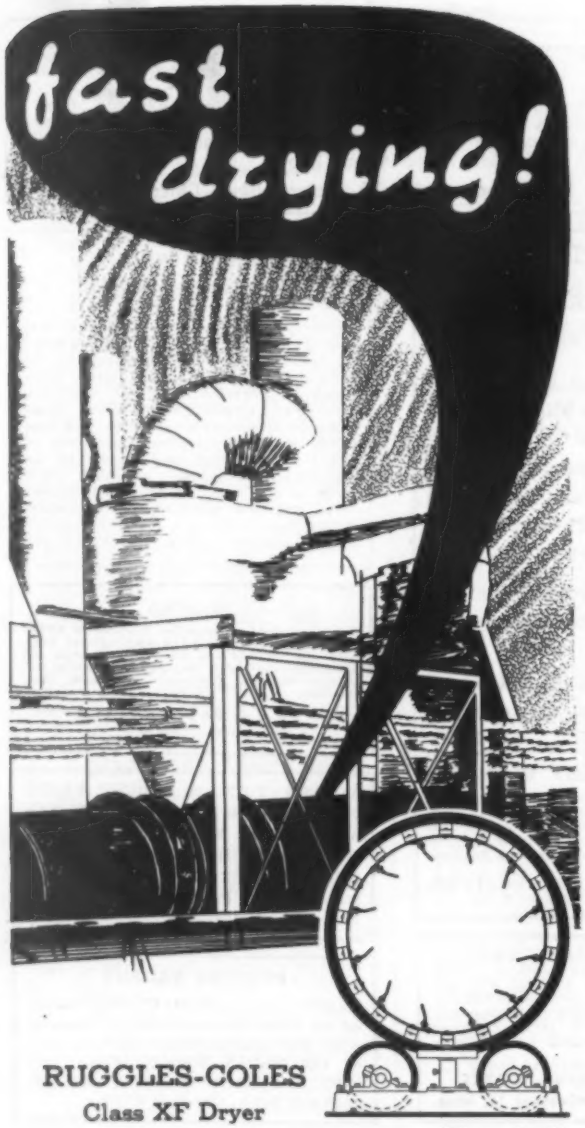

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INDEX TO ADVERTISERS

Allis-Chalmers Mfg. Co...12, 13
Amer. Cable Div..Ins. Bk. Cov.
American Chain & Cable Co., Inc.....Inside Back Cover
Amer. Manganese Steel Div.135
American Pulverizer Co.....140
Anchor Concrete Machy. Co.152
Austin-Western Co..... 29

Babcock & Wilcox Co..... 58
Barber-Greene Co..... 30
Baughman Mfg. Co.....158
Bemis Bro. Bag Co..... 46
Besser Mfg. Co.....144
Big Rock Stone & Mtl. Co..169
Bird, Mach. Co..Ins. Front Cov.
Birmingham Rail & Locomotive Co.....168
Blaw-Knox Co.....165
Blue Rock, Inc.....170
Boston Woven Hose & Rubber Co.....115
Bradley Pulverizer Co.....141
Brill Equipment Co.....167
Broderick & Bascom Rope Co.....157
Brooks Equip. & Mfg. Co... 2
Bucyrus-Erie Co..Out. Bk. Cov.
Buckeye Traction Ditcher Co..... 26
Butler Bin Co..... 43

Carlyle Rubber Co., Inc.156, 169
Caterpillar Tractor Co..... 19
Chain Belt Co.....33, 141
Chicago Perforating Co.....166
Chicago Steel Foundry Co..138
C. I. T. Corp.....123
Classified Advertising...167-173
Cleveland Rock Drill Div... 22
Cleveland Wire Cloth & Mfg. Co.....167
Coast Metals, Inc.....116
Colorado Iron Works Co....127
Columbia Const. Co., Inc....169
Combustion Engr. Co., Inc.. 49

Davenport-Besler Corp.....165
Dempster Bros., Inc.....175
Denver Equipment Co.....166
Dewey & Almy Chem. Co...139
Diamond Iron Works..... 20
Dixie Machinery Mfg. Co..155
Dorr Co.....166

Eagle Crusher Co.....159
Ensign-Bickford Co.....166
Equip. Corp. of America...168
Erickson Special Equipment Mfg. Co.....154
Erie Steel Construction Co. 24
Euclid Road Machinery Co.. 32

Farrel-Bacon Co.....140
Fate-Root-Heath Co.....166
Firestone Tire & Rubber Co.....105
Flexible Steel Lacing Co...164
Ford Motor Co..... 34
Frog, Switch & Mfg. Co....134
Fuller Co.....125

Gar Wood Industries, Inc... 56
Gardner-Denver Co..... 38
Gates Rubber Co..... 17
General Electric Co..10, 11, 107
General Excavator Co..... 52
Gilson Brothers Co.....165
Goodall Rubber Co.....155
Goodrich, B. F., Co..... 1
Goodyear Tire & Rubber Co. 9
Great American Industries, Inc. 36
Gruendler Crusher & Pulv. Co.....134
Gulf Oil Corp..... 88

Hammond Bag & Paper Co.166
Hardinge Co., Inc.....174
Harnischfeger Corp..... 47
Harrington & King Perf. Co.118
Hayward Co.....166
Heidenreich, Jr., E. Lee...172
Hendrick Mfg. Co.....163
Hercules Powder Co.....113
Hercules Steel Products....130
Hewitt Rubber Corp..... 54
Highway Equip. Co., Inc....163
Hunter Tractor & Machinery Co. 172
Hyster Co..... 31

Industrial Brownhoist Corp.136
International Harvester Co.111
Iowa Mfg. Co..... 27
Irving Bros. Gravel Co.....172

Jackson & Church Co.....153
Jaeger Machine Co.....165
Jeffrey Mfg. Co..... 41
Johnson, C. S., Co.....126
Jordan, Ira C.....172

Kennedy-Van Saun Mfg. & Eng. Corp.....14, 15
Kent Machine Co.....152
Kentucky Stone Co.....171
Knox Mfg. Co.....124
Koehring Co.....176
Kremser & Son, Frank A...170

LaPlant-Choate Mfg. Co., Inc. 35
Laughlin, Thomas, Co.....137
Leschen, A., & Sons Rope Co. 118
Le Tourneau, R. G., Inc.... 23
Lima Locomotive Wks., Inc.158
Link-Belt Co.....162
Lippert, L. K., Co.....168
Ludlow-Saylor Wire Co..... 48

McLanahan & Stone Corp...156
McLeod, Alexander T.....170
Mack Trucks, Inc..... 39
Macwhyte Co.....130
Manley Sand Co.....171
Merrick Scale Co.....140
Mid-Continent Equip. Co....171
Miller Bros.....171
Mine & Smelter Supply Co.132
Mine Safety Appliances Co.122
Miss. Valley Equip. Co.....167
Multiplex Conc. Mchy. Co...154
Murphy Diesel Co..... 40

National Production Co.....161
National Supply Co.....109
Naylor Pipe Co.....133
Neff & Fry Co.....152
New Haven Vibrator Co.....164
New Holland Machine Co...161
Nordberg Mfg. Co..... 42
Northwest Engineering Co.. 5

Osgood Co..... 52
Owen Bucket Co.....162

Pennsylvania Crusher Co... 37
Pioneer Engineering Works.117
Plymouth Locomotive Wks.166
Purdy Co.....171

Quaker Rubber Corp..... 28

Raymond Pulv. Div..... 49
Resisto-Loy Co. 159
Robins Conveyors, Inc..... 54
Roebling's, John A., Sons Co. 45
Rogers Iron Works Co..... 50

St. Regis Paper Co.....119
Sandhill Game Farm, Inc...173
Sauerman Brothers, Inc.....138
Schoonmaker, A. G.....167
Schoonmaker, Robert.....170
Scientific Concrete Serv. Corp. 142
Screen Equipment Co., Inc..157
Simplicity Engineering Co..131
Sly, W. W., Mfg. Co.....103
Smidth, F. L., & Co..... 89
Smith Agricultural Chemical Co.....168
Smith Engineering Works.. 25
Smith, H. Y., Co.....170
Smith, Sam, Machinery....172
Smith, W. M., Co.....167
Stanhope, R. C., Inc.....170
Stephens-Adamson Mfg. Co. 6
Stoody Co..... 8
Stroh Process Steel Co.....160
Sturtevant Mill Co..... 21
Syntron Co. 142

Taylor Forge & Pipe Works 44
Texas Co. 64
Thew Shovel Co..... 3
Thornton Tandem Co..... 51
Timken Roller Bearing Co.. 4
Trackson Co. 18
Traylor Engr. & Mfg. Co... 7
Twin City Iron & Wire Co.154
Tyler, W. S., Co.....162

Union Fork & Hoe Co.....136
Universal Atlas Cement Co.. 60
Universal Conc. Pipe Co....154
Universal Engineering Corp. 53
Universal Road Mchy. Co..163
Universal Vibr. Screen Co..132
Unverzagt, G. A. & Son....168

Vulcan Iron Works..... 16

Walsh, J. T.....170
Walsh, Richard P., Co.....171
Ward LaFrance Truck Div. 36
Weiss, B. M., Co.....171
Western Precipitation Corp.129
Wilfley, A. R., & Sons, Inc.166
Williams Patent Crusher & Pulv. Co.....160
Wisconsin Motor Corp.....162
Worthington Pump & Machinery Corp.....120, 121

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